AMERICAN ANTIQUITY

UNIVERSITY
AUG 10 1951
MUSEUMS
LIBRARY
E
51
A495
1
ANTHROPOLOGY LIBRARY

VOLUME XVII
NUMBER 1 — PART 1
JULY 1951

PUBLISHED BY THE SOCIETY
FOR AMERICAN ARCHAEOLOGY

THE SOCIETY FOR AMERICAN ARCHAEOLOGY

OFFICERS

President: JAMES B. GRIFFIN, University Museums Building, Ann Arbor, Michigan.

First Vice-President: JUNIUS BIRD, American Museum of Natural History, Central Park West at 79th St. New York 24, N. Y.

Second Vice-President: MADELINE KNEBERG, Department of Anthropology, University of Tennessee, Knoxville, Tenn.

Secretary: GEORGE I. QUIMBY, Chicago Natural History Museum, Chicago 5, Illinois.

Treasurer: GEORGE F. WILL, 322 Fourth St., Bismarck, North Dakota.

Editor: JESSE D. JENNINGS, Department of Anthropology, University of Utah, Salt Lake City 1, Utah.

Associate Editor: ERIK K. REED, National Park Service, Region Three, Santa Fe, New Mexico.

Assistant Editors: J. LOUIS GIDDINGS, Arctic; CARROLL BURROUGHS, Pacific Coast; KATHARINE BARTLETT, Southwest; CARLYLE S. SMITH, Plains; DAVID A. BAERREIS, Northern Mississippi Valley; WILLIAM A. RITCHIE, Northeast; JOHN M. GOGGIN, Southeast; J. ERIC THOMPSON, Middle America; JOHN H. ROWE, South America; and ALEX D. KRIEGER, Early Man.

Members of the Executive Committee in addition to the elected officers: ALEX D. KRIEGER (to 1952), Department of Anthropology, University of Texas, Austin 12, Texas; JOHN B. RINALDO (to 1952), Chicago Natural History Museum, Chicago 5, Illinois; W. C. McKERN (to 1953), Milwaukee Public Museum, Milwaukee 3, Wisconsin; WALDO R. WEDEL (to 1953), United States National Museum, Washington 25, Wash., D. C.

American Antiquity is printed by the University of Utah Press, University of Utah, Salt Lake City 1, Utah.

American Antiquity is published by the SOCIETY FOR AMERICAN ARCHAEOLOGY at the University of Utah, Salt Lake City, 1 during the months of January, April, July, and October. Subscription is by membership. Annual membership dues are $6.00; $5.00 of the dues are for a subscription to *American Antiquity* and other releases, as issued.

Entered as second-class matter June 1, 1951, at the post office at Salt Lake City, Utah, under the Act of March 3, 1879.

Proposed articles and contributions to "Facts and Comments" should be submitted to the Editor, Jesse D. Jennings; publications for review, reviews, and material for "Notes and News," to the Associate Editor, Erik K. Reed, at 238 Griffin Street, Santa Fe, New Mexico.

Subscriptions and orders for back issues or *Memoirs* should be addressed to the Treasurer, Glenn A. Black. *

Please address all requests for information to the Secretary, George I. Quimby.

---

* Attention is directed to an unfortunate oversight: Subscriptions and orders for back issues or Memoirs should be directed to Treasurer George F. Will—not Glenn Black.

AMERICAN ANTIQUITY

VOL. XVII JULY, 1951 No. 1

PREHISTORIC WELLS IN EASTERN NEW MEXICO

GLEN L. EVANS

INTRODUCTION

PREHISTORIC shaft-like excavations which may have been aboriginal water wells were discovered in the fall of 1949 and the summer of 1950 at the well-known early man site[1] 12 miles southwest of Clovis and 7 miles north of Portales, New Mexico. Work at this site is part of an extended program of geologic studies of Quaternary deposits on the High Plains of western Texas and eastern New Mexico being carried on by the Texas Memorial Museum.[2] A report dealing with the geology and ancient archaeological horizons at the Clovis site will be ready for publication in the near future, but a separate description of the shafts or wells seems desirable at this time.

The site is an abandoned gravel quarry near the head of a short tributary valley of Blackwater Draw, located near the western edge of the southern High Plains, on the old P. H. Hanagan ranch (now owned by Anderson Carter of Portales, New Mexico). The gravel quarries expose deposits of an ancient shallow lake which contain abundant remains of fossil bison and other vertebrate fossils, as well as several distinct types of early man artifacts. The wells, which are considerably later than the fossil and artifact-bearing strata, begin on a buried erosional surface separating the lake deposits from overlying, younger beds, and extend downward through the lake deposits to gravel bedrock.

A total of thirteen definitely recognized wells, the locations of which are shown on Figure 1, were found in new excavations and on the old walls of two abandoned gravel quarries. Also, several remnants of fill similar to that found in the wells and occurring at the same horizon may represent other wells which were almost completely destroyed by the gravel quarrying operations.

The wells were discovered in the course of detailed mapping of the strata exposed at the site. In order to obtain continuous exposures of the several strata around the quarries it was necessary to cut back and clean sections of the walls where weathering and slumping had partially concealed the section. The wells were first detected when exposed on the freshly-cut surfaces where the mixed character and higher moisture content of their fill caused the wells to show up prominently against the homogeneous and lighter-colored intersected strata. Subsequently, several other partially dissected wells, which had been so obscured by weathering that they had escaped earlier recognition, were located at different places along the old quarry walls, and others were found in the course of digging for fossils and artifacts. The nearly vertical quarry walls, totaling about 2,300 running feet, and the new excavations are the only exposures of the horizon at which the wells occur. These exposures represent only a small percentage of the old lake area in which the wells might be expected to occur.

DESCRIPTION OF STRATA

Following is a description of the strata involved in the interpretation of the wells. A more detailed description of the strata and their contained fossils and artifacts will appear when work at the site has been completed. The relationship of the wells to the strata they penetrate and to the overlying beds is

[1] This site was partially excavated by Edgar B. Howard and later by J. L. Cotter. The literature relating to archaeological and geological aspects of the site includes papers by Ernst Antevs (1935, 1949), Frank Bryan (1938), John L. Cotter (1937, 1938), E. B. Howard (1935, 1939), W. A. Price (1944), E. H. Sellards (1940), and Chester Stock (1937).

[2] Associated with the writer in the recent work at the Clovis site were E. H. Sellards, Grayson E. Meade, A. H. Witte, and several helpers.

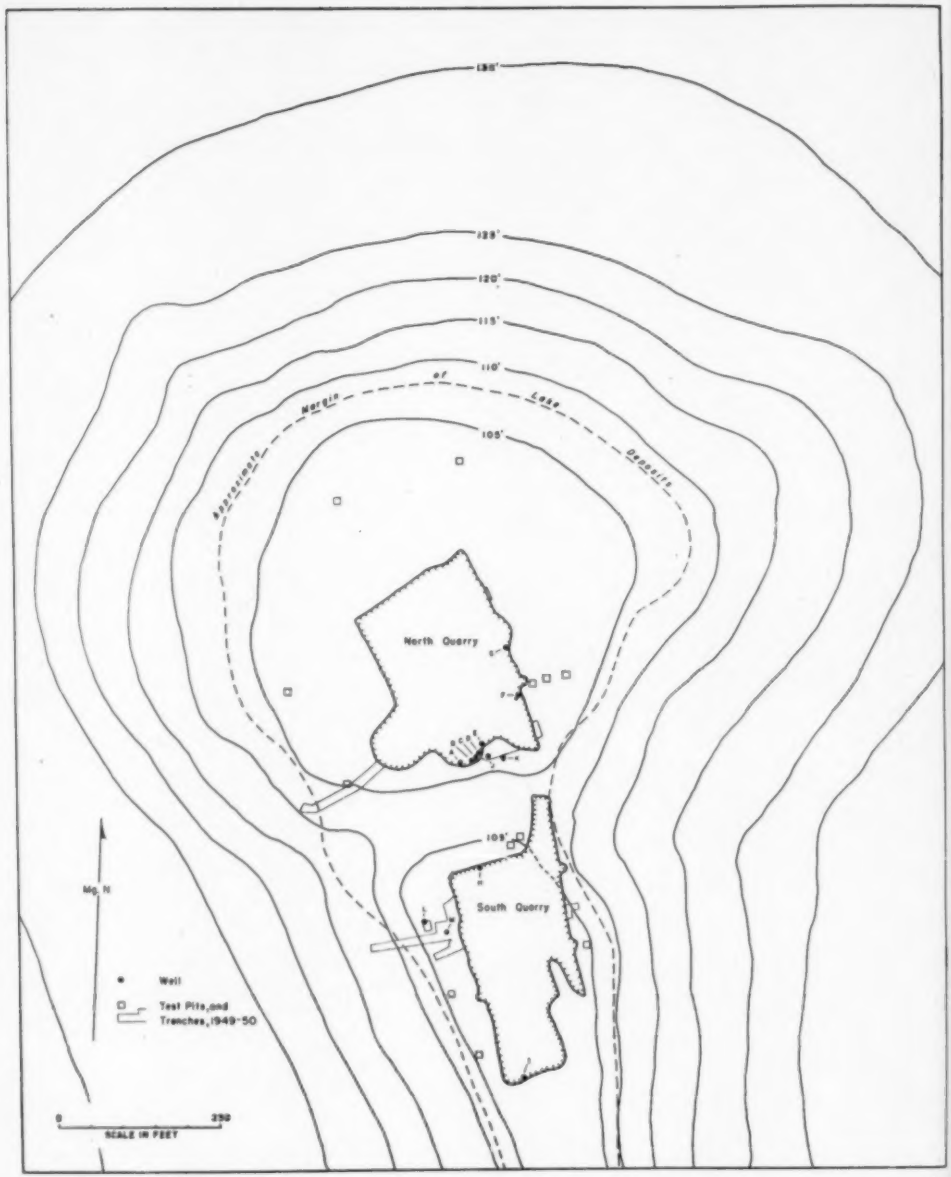

FIG. 1. Map of gravel quarry locality, Clovis-Portales area, eastern New Mexico.

illustrated in Figures 2, 3, 4, and 5, and the area covered by pond and lake deposits is shown in Figure 1.

Bed 1 (Bedrock gravel). Bed 1, the lowermost member exposed in the quarries, is a thick, reddish-brown gravel and sand deposit of older Pleistocene or Pliocene age. It is a member of the bedrock series of strata in which the valley is entrenched and upon which the much more localized lake deposits are resting by disconformity. The gravel is a shallow but permanent aquifer, the present water table being an average of 8 to 10 feet below the upper contact as exposed in the quarries. The full thickness of the member is not exposed, although it is known to extend several feet below the water table level.

Bed 2. Bed 2 is the lowermost and oldest member of lake and pond deposits at the Clovis site. In the middle part of the lake area, bed 2 consists of well-sorted, gray, friable sands which were deposited on the valley floor by gently flowing water derived from springs in the immediate vicinity. Toward its margins the member grades to a weakly-cemented conglomerate consisting mainly of sand with clay balls and caliche pebbles derived from the bedrock of adjacent valley walls. The member ranges in thickness from less than a foot in the middle area, where it was most eroded, to about 5 feet near the margins. It is separated from both underlying and overlying members by disconformities.

Flint and bone artifacts, as well as several genera of Pleistocene mammals, of which elephant and horse are most abundant, occur at all levels in bed 2, and were found at several places within the quarry exposures.

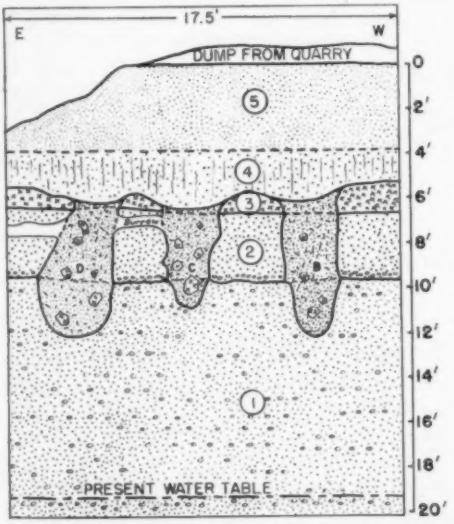

FIG. 2. Section through three closely spaced wells, D, C, and B.

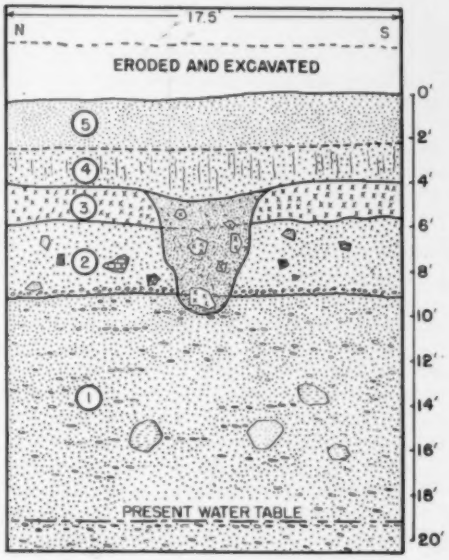

FIG. 3. Section through well F.

According to Cotter (1938), the fossil elephants with associated Clovis Fluted points and two bone artifacts, which he collected at the site, were in the upper part of the bed. In 1950 several additional bone and flint artifacts were collected at levels ranging from the base to the top of the bed.

Bed 3. Bed 3 consists mainly of diatomaceous earth in the central area, grading to humus-stained, compact sand near its marginal limits. The color of the relatively pure diatomaceous material varies from white when dry to deep blue-gray when wet. The stratum is saucer-shaped in form, the central portion being about 5 feet lower than the marginal parts, and was deposited in a permanent, spring-fed lake which probably had an outlet through the connecting tributary valley to Blackwater Draw. The deposit convincingly indicates a humid or pluvial stage when the water table was at a high level and provided a continuous flow of spring water into the lake. Remains of an extinct species of bison occur in extraordinary concentrations in the middle and lower parts of nearly all exposed sections of the member, and several Folsom Fluted points were found in direct association with the fossil bison during the recent work at the site. The average preserved thickness of the member within the area where the wells occur is between 1.0 feet and 1.5 feet, but the original thickness was somewhat greater, as much of the surface was wind-eroded previous to the deposition of bed 4.

Bed 3a. This erosional surface not only cuts out a part of bed 3 but has completely removed another stratum of lake deposits occupying a stratigraphic position be-

tween beds 3 and 4 from most of the exposed area of the site. One of the small preserved remnants of this eroded member was penetrated by well K, and is indicated as bed 3a in Figure 5. A larger preserved remnant of bed 3a, exposed on the west wall of the south quarry, contains abundant fossilized bison bones and associated flint dart points, including some that closely resemble Eden and Scottsbluff points. The fossil and artifact horizon in bed 3a usually overlies the bone bed with Folsom points found in bed 3 by an interval of 14 to 22 inches.

The depth of wind erosion into deposits formerly accumulated in a permanent lake indicates a long period of aridity which caused a lowering of water table and exposed the drying lake sediments to attack by the wind. The diatomaceous earth, due to its toughness and probably also to the fact that it is highly adsorptive and tenaciously retains moisture, seems to have served as an effective local check on down-cutting by wind erosion.

Bed 4. Bed 4, in its lower-lying pond facies, consists of compact, vertically jointed, humus-stained sand, grading upward and laterally to massive reddish-brown sands. The sands apparently were deposited mainly by the wind, but sheet wash from surrounding slopes may have contributed in concentrating the sand on the valley floor. No fossils or artifacts were found definitely in primary position, but in the area of the old lake deposits the basal part of the member contains numerous fragments of reworked fossil bone and lumps of diatomaceous earth derived from erosion of underlying members. Also a few artifacts found in the basal part of the member were probably reworked from older deposits. There is no evidence of true lake facies in this member, but the relatively high percentage of carbonaceous material in the lower-lying parts of the bed indicates temporary ponding of surface waters. The degree of oxidation, leaching, jointing, and compaction of the marginal and upland facies of the member indicates a fairly stable surface with attendant soil development previous to deposition of the overlying surface sands of bed 5. The member ranges in thickness from 1.5 feet to 3.5 feet where exposed in the immediate area of the site.

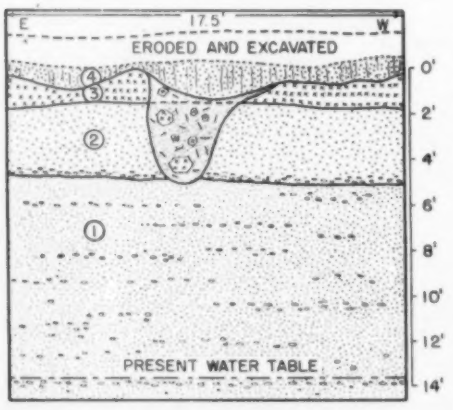

FIG. 4. Section through well I.

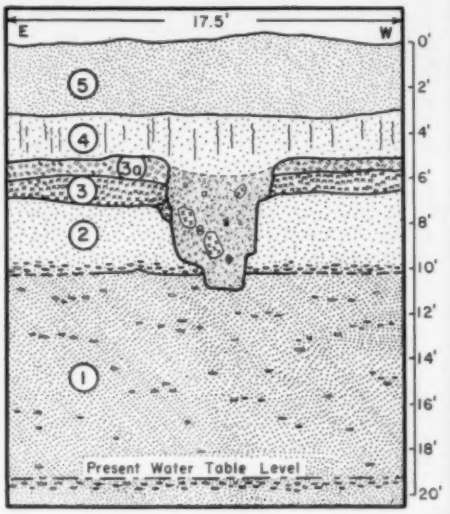

FIG. 5. Section through well K.

Bed 5. Bed 5 consists of light tan, wind-deposited sand which forms the surface layer over most of both valley and upland of the general area. The sand typically forms a somewhat modified dune topography with a thin soil development which supports a fairly dense covering of coarse range grasses and occasional small shrubs. No archaeological materials or identifiable animal remains were found in exposures at the site, but at a number of places in the general area campsites containing small arrow points and pottery characteristic of the later Plains Indians are weathering from the lower part of what appears to be the same surface sand member. The thickness varies greatly from place to place, but ranges from a few inches to more than 5.0 feet in the immediate area of the site. Modern localized blowouts have cut through this member into underlying strata. One of these blowouts is said to have cut deeply enough to expose the gravels in bed 1, which resulted in the quarrying operations.

DESCRIPTION OF THE WELLS

Of the thirteen wells located, only wells F, I, K, and M were completely excavated; the others were partially excavated and studied mainly from vertically sectioned exposures. The wells are quite similar in general appearance, as seen on vertical sections. They all occupy the same stratigraphic position, beginning from the same buried erosional surface

and extending downward successively through beds of diatomaceous earth, gray sand, and into the upper part of the red gravel substratum. The fill in all the wells consists of a heterogeneous mixture of materials from the three strata penetrated, with some later sand washed down from the overlying bed 4 into interstices and shrinkage openings.

The respects in which the wells show most apparent variations are in the different width-to-depth ratios and different inclinations of the walls (compare well B on the right side of Figure 2 with F and I shown in Figures 3 and 4). All of the thirteen wells examined are within the range of variation of those illustrated in Figures 2, 3, 4, and 5. They range in depth from 5 feet to 6.5 feet. The width ranges from 2.5 feet to 5 feet at the top, and from 1 to 2 feet at the bottom. The walls may be either vertical, stepped, or steeply inclined. The apparent undercutting of one wall of well D, seen on the left side of the group illustrated in Figure 2, is at least in part illusory, as the section was measured from a sloping surface which cuts the well obliquely from near its inner edge at the top to near the median axis at the bottom. The caving character of strata in immediate proximity to this well prevented cutting the section to a vertical plane.

Several of the wells, including four of those herein illustrated, have shallow notches or abrupt, step-like benches at one or more places on the walls. These benches, or steps, are from 3 inches to a maximum of 12 inches wide, and extend around one-fourth to one-third of the wells' circumference. Some of the notches may have formed by accidental small-scale slumping, but others seem to have been made intentionally during excavation of the wells. The position and appearance of some of the notches, particularly those on well K (Fig. 5) and well F (Fig. 3), suggest that they may have been used as steps or foot supports in climbing in and out of the wells. Certainly a shallow notch in the more friable facies of bed 2 would not support the full weight of a man, but the relatively compact parts of both beds 1 and 2 would probably stand up under such use for a limited time.

THE FILL

The wells are filled with a mixture of diatomaceous earth, sand and gravel derived from the strata penetrated, and with different proportions of later sand from bed 4 which has washed down into shrinkage cracks and other openings in the original fill. In some of the wells, particularly in B, C, and D, the proportion of material from beds 1, 2, and 3 in the fill corresponds closely with the size of the excavation made in each of the beds. This indicates that each well was refilled with the material excavated from it. In wells F and K, and some of the others with large top diameters, the fill contains a relatively large proportion of sand from the overlying bed 4. This may indicate either that some of the wells were not as completely refilled as others, or that bed 4 had already begun to form at the time some of the wells were being dug.

Some, if not all, of the wells must have been filled originally almost to the level of the land surface, as a shallow sag, such as is now seen at the top of the fill, would be expected to develop from gradual compaction of the loose material. As no remnants of dumps or spoils banks could be recognized around the outer edges of the wells, it is possible that wind erosion scattered and removed any small dumps of loose materials left on the smooth land surface.

It seems apparent that at least a part of the wells were filled soon after being dug, as there is no evidence of any but minor caving in the friable sand facies of bed 2, which some of the wells penetrate. These sands, when wet, will not stand unsupported on a vertical face for more than a short time. The reason for filling the wells is an interesting matter for speculation. Perhaps, as has been suggested, a fear of contamination or drying up of a precious water supply, or of revealing a secret water source to unwelcome peoples, may have motivated the filling. The site may have been used as an occasional way-station by hunting or traveling groups, who dug a new well at each visit, then refilled it after their temporary needs had been supplied.

METHOD OF DIGGING WELLS

All of the strata penetrated by the wells are unindurated and are subject to digging with such tools as could be fashioned from stone, wood, bone, or horn. However, the diatoma-

ceous earth, being a tough, spongy substance, is much more resistant to digging by hand methods than are the underlying sand and gravel members.

Although no tools or definite tool markings were found associated with the wells, some preserved features suggest a probable method of digging employed by the aboriginal excavators. The lips of the wells, formed in the upper part of the diatomaceous stratum, are typically smooth, beveled surfaces; and the fill in some of the wells contains angular blocks of diatomaceous earth up to a foot in diameter, many of which still enclose fossil bison bones that are characteristically present in the lower part of the stratum. The blocks derived from the lower part of the diatomaceous bed, and the smoothed lip at the upper part, suggest that the excavators may have first scraped a conical opening through the tough diatomaceous earth, then scooped out the softer sand beneath and enlarged the diameter of the opening by caving off peripheral blocks. Once a satisfactorily large opening was made in the diatomaceous earth, the underlying sand and gravel beds could have been dug out with comparatively little effort. The fact that no definite tool markings could be recognized, even in the diatomaceous earth, which is sufficiently insoluble, tough, and fine-grained to retain impressions made by a sharp, picking instrument, would be explained if a scraping and caving technique of digging were actually employed.

ORIGIN AND PURPOSE

The similar form of the several wells, the fact that they were dug vertically to a common horizon, the strong indication that they were filled soon after digging, as well as other features discussed in foregoing paragraphs, seem to exclude any satisfactory explanation of their origin other than by human agency. The age indicated by overlying strata leaves little doubt that the wells were dug long before the beginning of the historical period in the region. However, since no artifacts have been found either in the wells or on the buried surface from which they were dug, there is at present no means of identifying the people who made the wells with a known culture.

Although primitive man might conceivably have made such excavations for any of various purposes, the available evidence indicates that they were dug for water, and as yet there is no good evidence in support of other possibilities. All of the wells were dug from a barren, wind-scoured surface which indicates a dry climate and implies a paucity or absence of surface water in the area. The wells penetrate the upper part of a gravel sub-stratum which is still a shallow aquifer, although the present water table is 7 or 8 feet below their average bottom level. The bottom four inches of fill in well B exhibits layering unmistakably due to settling in water, and a faint indication of similar layering was recognized in the bottoms of wells D and F. The wells were all dug from the more deeply eroded parts of the old lake floor where the water table could be encountered at shallowest depth.

If, as seems probable, the wells were dug for water, one of the questions that arises is how the primitives could have known that a shallow source of water lay beneath what normally must have been a quite dry surface. Perhaps a tell-tale dampness accumulated at times on the surface of more deeply eroded places due to moisture rising by capillary action, or possibly some animal burrowing for water may have led to the discovery. The fact that the wells are all bottomed in the same stratigraphic horizon and at nearly the same actual elevation indicates an essentially stable position in the water table throughout the period during which the wells were being dug, and seems to eliminate the possibility that a knowledge of the water source had been carried down from a time when the water table was nearly at surface level. If such knowledge had been possessed and wells had been dug from time to time over a very long period, one would expect to find significant differences in elevation of the well bottoms reflecting gradual changes in water table level.

Since both water table and the old land surface seem to have remained at essentially stable positions during the time the wells were being dug, it is likely that all were dug within a relatively short period of time, perhaps not more than a few decades or a few human generations.

AGE OF THE WELLS

The available evidence bearing on the age of the wells includes the indicated drop in water table between the time when a permanent lake existed at the site and the time

the wells were being dug; the evidence of extensive wind erosion during the same period, and relationship of the wells to this old erosional surface; and the character of sediments which overlie the wells.

The spring and lake deposits, represented mainly by beds 2 and 3, record a humid or pluvial stage belonging in the latter part of the Wisconsin period. Antevs (1949) estimated the age of these deposits with their contained fossils and early artifacts at between 10,000 and 13,000 years. The pluvial stage was followed by a period of increased aridity which resulted in lowering the water table, causing the lake to dry up and exposing the lake sediments to wind erosion. The wells were dug after the water table had dropped some 8 or 10 feet from its former high level—from the upper preserved limits of permanent lake deposits to the average level of the well bottoms. Considering the flat and undissected character of the surrounding terrain, such a drop in water table must represent a long period of time in relatively arid climatic conditions.

The buried, wind-eroded surface from which the wells were dug is also a feature related to a climatic period of increased aridity. Inasmuch as all the wells that have been recognized were dug from places where erosion cut deepest into lake sediments, and since there is evidence of only minor additional erosion between the time the wells were filled and the time they were buried beneath later sediments, it is evident that the digging was done near the end of the local erosional activity.

The sand member, bed 4, immediately overlying the filled wells is a part of a widespread wind deposit which probably formed during the same dry period during which the lake deposits were being eroded. However, the presence of abundant carbonaceous material in the part of the bed that lies over the central area of the old lake indicates that temporary ponds occasionally formed in the lower places on the valley floor. This suggests that a part of the deposit accumulated under somewhat moister conditions than obtained while severe wind erosion was taking place. A relatively well developed soil formed in this horizon before

FIG. 6. Partially cleared section of quarry wall. Well F is seen in central part of picture.

the surface sand represented by bed 5 was deposited. This soil may represent a considerable period of time, and is indicative of stable and moderately moist climatic conditions.

Bed 5 belongs to the last stage of widespread wind deposition in the region. The very slight oxidation, weak soil development and somewhat modified dune topography of this member indicate that it formed at a relatively recent time. Artifacts of late prehistoric Indians which are weathering from the surface sands at a number of places along Blackwater Draw also indicate a recent origin for the deposit.

These considerations serve to fix the age of the wells only within broad limitations—within a period considerably later than the Folsom and other early archaeological horizons, and probably considerably earlier than the late prehistoric Indian horizons of the region. The evidence that the wells belong to a dry period when the water table was at a position intermediate between its former high level and present level is not sufficiently conclusive for close dating in archaeological terms, but may aid in ultimate dating within a specific substage of post-glacial chronology.

COMMENTS AND CONCLUSIONS

Judging from the number of wells exposed on the walls of the gravel quarries, it is likely that a much larger number that have not been exposed are still preserved at the site. A thorough investigation of additional wells almost surely would reveal new data and permit of a more trustworthy interpretation as to their purpose, age, and archaeological relationship. Unfortunately, exploration of the more favorable places at this site will involve moving large quantities of earth, which will be both expensive and time-consuming.

There is a possibility that the practice of digging shallow water wells was much more common among some of the Indians of the High Plains region than is generally suspected. The wells here described were not recognized until they were exposed in freshly-cut sections, and it is doubtful if they would have ever been noticed in natural exposures such as blowouts unless a specific search had been made for them. There are many areas in eastern New Mexico and western Texas where shallow groundwater could have been reached by such wells as those at the Clovis site. A careful search of exposures in the deeper basins and valleys within these favorable areas should be made to test the possibility of other occurrences. The vicinity of large Indian campsites in shallow groundwater areas which are devoid of surface water might prove particularly worth-while places to prospect.

If prehistoric water wells should prove to have more than local distribution on the High Plains, a study of such wells might reveal information of great value to archaeologists, geologists, and climatologists. A knowledge of past climatic stages is essential to the interpretation of post-glacial chronology of the region, and datable water wells might prove a most dependable source of data on former levels of water table, which on the High Plains is a sensitive indicator of climate.

BIBLIOGRAPHY

ANTEVS, ERNST

1935. The Occurrence of Flints and Extinct Animals in Pluvial Deposits near Clovis, New Mexico, Part II, Age of Clovis Lake Beds. *Proceedings, Philadelphia Academy of Natural Sciences*, Vol. 87, pp. 304-11. Philadelphia.

1949. Geology of the Clovis Sites. In *Ancient Man in North America*, by H. S. Wormington, pp. 185-90, Denver Museum of Natural History.

BRYAN, FRANK

1938. A Review of the Geology of the Clovis Finds Reported by Howard and Cotter. *American Antiquity*, Vol. 4, No. 2, pp. 112-30. Menasha.

CLARK, WILLIAM T., JR.

1938. The Occurrence of Flints and Extinct Animals in Pluvial Deposits near Clovis, New Mexico, Part VII, Pleistocene Mollusks from the Clovis Gravel Pit and Vicinity. *Proceedings Philadelphia Academy of Natural Sciences*, Vol. 90, pp. 119-21. Philadelphia.

COTTER, JOHN L.

1937. The Occurrence of Flints and Extinct Animals in Pluvial Deposits near Clovis, New Mexico, Part IV, Report on the Excavations at the Gravel Pit in 1936. *Proceedings, Philadelphia Academy of Natural Sciences*, Vol. 89, pp. 2-16. Philadelphia.

1938. The Occurrence of Flints and Extinct Animals in Pluvial Deposits near Clovis, New Mexico, Part VI, Report on Field Season of 1937. *Proceedings, Philadelphia Academy of Natural Sciences*, Vol. 90, pp. 113-7. Philadelphia.

Evans, Glen L., and Grayson E. Meade

1945. Quaternary of the Texas High Plains. *University of Texas Publication 4401*, pp. 485-507. Austin.

Howard, Edgar B.

1935. Evidence of Early Man in North America. *The Museum Journal, University of Pennsylvania Museum*, Vol. 24, Nos. 2-3. Philadelphia.

1939. The Clovis Finds Are Not Two Million Years Old. *American Antiquity*, Vol. 5, No. 1, pp. 43-51. Menasha.

Patrick, Ruth

1938. The Occurrence of Flints and Extinct Animals in Pluvial Deposits near Clovis, New Mexico, Part V, Diatom Evidence from the Mammoth Pit. *Proceedings, Philadelphia Academy of Natural Sciences*, Vol. 90, pp. 15-24. Philadelphia.

Price, W. Armstrong

1944. The Clovis Site: Regional Physiography and Geology. *American Antiquity*, Vol. 9, No. 4, pp. 401-7. Menasha.

Sellards, E. H.

1940. Early Man in America: Index to Localities and Selected Bibliography. *Bulletin, Geological Society of America*, Vol. 51, No. 3, pp. 373-432. New York.

Stock, Chester, and Francis D. Bode

1937. The Occurrence of Flints and Extinct Animals in Pluvial Deposits near Clovis, New Mexico, Part III, Geology and Vertebrate Paleontology of the Late Quaternary. *Proceedings, Philadelphia Academy of Natural Sciences*, Vol. 88, pp. 219-41. Philadelphia.

Texas Memorial Museum
Austin, Texas
November, 1950

A WORKSHOP SITE OF EARLY MAN IN DINWIDDIE COUNTY, VIRGINIA[1]

Ben C. McCary

INTRODUCTION

David I. Bushnell, Jr., first aroused wide interest in the fluted points found in Virginia. He accomplished this primarily by an article in the June 9, 1934 issue of the *Literary Digest*, in which he announced the discovery of "two Folsom points" in Virginia. This article and subsequent references to these two "points of recognized Folsom type" (Bushnell, 1935, pp. 35-6, 56) called special attention to the importance and possibilities of such finds in the East. In 1934, only one collector of Virginia projectile points, Arthur Robertson of Chase City, Virginia, could claim "five or more" of these fluted points (Wells, 1935, pp. 1, 14). However, the intense interest which Bushnell created stimulated a search in Virginia for this rare type of point, with the result that shortly after Bushnell's 1934 announcement, sporadic finds of fluted points having a resemblance to both the Folsom Fluted and the Clovis Fluted began to be noted in various parts of the State. Their occurrence seemed to indicate that there actually was a paleo-Indian[2] in Virginia.

[1] The site here described is the Williamson site, found by John C. Smith and Charles Edgar Gilliam of Petersburg, and Ben C. McCary of Williamsburg, Virginia. Many visits were made to the site in 1949 and 1950. Reverend J. R. McAllister and John Adkins of Dinwiddie, Virginia, gave helpful assistance. Roy Ampy who owns a small part of the site, has been most cooperative. Special acknowledgment is due the Williamsons—Joshua S., John E., and his son Ashley—for permission to do field work so frequently on their land, and for the many hours that they spent literally combing the surface for artifacts of early man.

[2] In this article the terms "paleo-Indian" and "early man" have the same meaning and refer specifically to that group associated with the so-called eastern Folsom complex. The term "neo-Indian" is used to refer to the groups which followed "early man" apparently after a time-gap of unknown extent. (See Miller, 1950, pp. 273-6, 286.)

In 1940 Bushnell further reported the finding at Mons in Bedford County, Virginia, of "two Folsom points" and "A large number of flake-knives and small scrapers . . . mingled with other material . . . on an ancient Indian settlement" (Bushnell, 1940, pp. 4-14). At the same time Bushnell summarized very well the progress made in the study of early man in Virginia by the following statement:

> No workshop has been discovered where the points were made. Such a workshop would be revealed by broken or unfinished pieces intermingled with the cores and spalls which would have resulted from the shaping of the blades. Nor is a specimen known to have been discovered in an undisturbed mass of sand or earth, or associated with traces of extinct fauna that would indicate or suggest its approximate age or the period to which it belonged. (Bushnell, 1940, pp. 145-6.)

At that time it did not appear that Virginia's contribution to the problem of early man in the East would be very helpful. This picture changed somewhat when Carl Miller discovered in Mecklenburg County, Virginia, sufficient evidence to announce that several "possible Folsom camp sites" had been found in the Buggs Island Reservoir area (Miller, 1947, pp. 28-9; 1949, pp. 15-6; 1950, pp. 273-88). It should be emphasized that Miller does not lay claim in any of his articles to the discovery of an actual or definite Folsom campsite.

In the early part of 1947 I began, in collaboration with the Archaeological Society of Virginia, a continuing survey of fluted points found in Virginia. The first results of the survey, published in September 1947 (McCary, 1947, pp. 1-26), revealed three centers of concentration of these points, namely: Mecklenburg County (already known to have produced a number of points), Bedford-Campbell area, and the Dinwiddie-Amelia area (Fig. 7). The Mecklenburg center, by far the largest, provided 63 of the 126 points uncovered by the survey. The counties of Bedford and Campbell provided 11, and Dinwiddie and Amelia 13. All the remaining fluted points came from counties which yielded from one to three points with the exception of Caroline County which accounted for four. At this writing

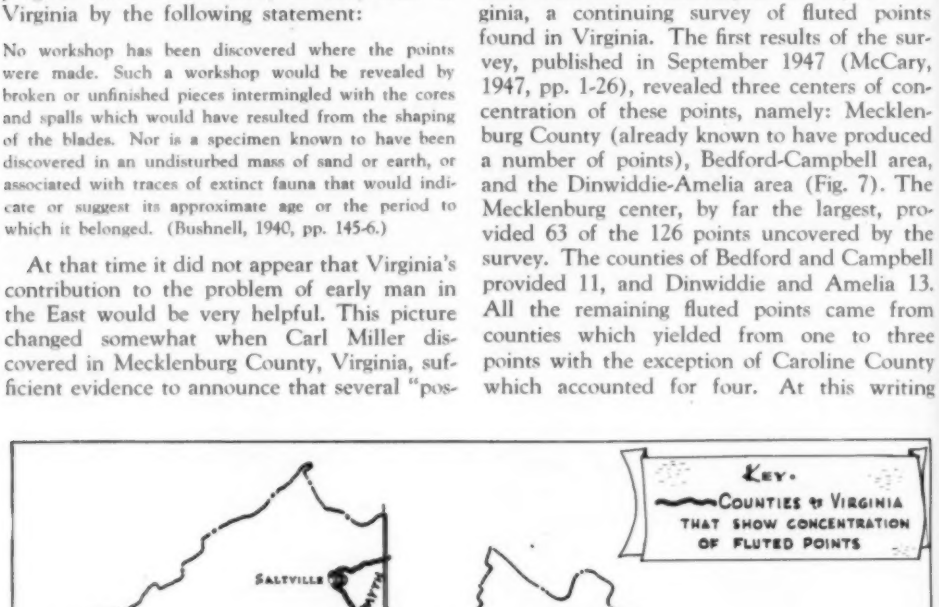

FIG. 7. Map of Virginia.

(December 1950), we have recorded 185 fluted points which have come from 34 of the 100 counties of Virginia. The number of points from each of the three known centers of concentration has slowly increased. This is especially true of the Dinwiddie-Amelia area, but no new center has come to light. However, the survey points to several sections of the State where the search for artifacts of early man should be intensified. For example, the vicinity of Saltville commands special interest because it has produced four fluted points, three of which were apparently found in a stratum of earth bearing mastodon bones (Pickle, 1946, pp. 3-7; Lewis, 1947, p. 32; Woolsey, 1950, p. 12; personal communication R. G. Maiden of Saltville, Virginia).

THE WILLIAMSON SITE

My continuing survey of fluted points had revealed in 1948 that four points of this type had been found on the farm of Joshua S. and John E. Williamson in Dinwiddie County. These four points constituted the primary evidence which was to increase eventually through splendid cooperative efforts and lead to the manifest conclusion that early man had at this place a workshop site. The Williamson's farm is located about five miles east of Dinwiddie in Dinwiddie County, Virginia. The site begins approximately one hundred and fifty yards north of the farm house and runs one mile eastward along a flat-top ridge spreading at its widest point about two hundred yards. The eastern edge of the site extends nearly one quarter of a mile over on the adjoining farm owned by Roy Ampy. From this point the land slopes gently northward to Little Cattail Creek.

The surface of this area is covered with many cores and thousands of unutilized flakes which converge in greater numbers at the eastern part of the site where the Williamson's property line meets that of Roy Ampy. It is evident that the major part of the flaking was done on this part of the site.

From the site there have been recovered 33 fluted points, 174 snub-nosed scrapers, 24 side scrapers, 16 fluted basal ends of knives, and several implements which resemble gravers.

The material used for implements consists almost entirely of variegated chert with cream, brown, blue and red dominating. Many of the flakes have weathered considerably yet some of them, especially those of yellow and brown, show very little change. It has not been determined whether the chert occurred in small detached masses on the site or was brought in from some nearby source. The largest stones observed which do not reveal any flaked surfaces average less than 10 inches in diameter. Much of the material is translucent. No other concentration of chert is within 12 miles of the site. As a matter of fact, only 3 other rather large concentrations have been found in the county. However, a few pieces of it occur on many of the neo-Indian sites. It can be stated, therefore, that chert is comparatively rare in the region. Quartzite which usually occurs in abundance is, on the other hand, scarce on the Williamson site. Only 3 or 4 cores of it have been found. A few flakes of rock crystal have also been picked up.

Much of the material reveals faults in the form of incrustations of minute quartz crystals which must have frequently led to breakage when flaking was undertaken. The flaking fitness on the average appears to be only fair. Examination reveals that rather large flakes, averaging 2 inches in length, were usually struck from the cores which then became rejects. The flakes were worked into knives, scrapers, blades and points. The flaking technique observed on the large blades and broken basal parts of large knives, as well as part of the surface of the smaller implements, is that of percussion by means perhaps of another stone. The edges of the finished scrapers, several small blades and the fluted points reveal flaking done by the pressure method. On all the implements the flake scars are of different sizes and distributed irregularly over the surfaces. A great number of flakes are faceted as the result of previous flaking, and many of them display a striking platform and a rather prominent bulb of percussion.

PALEO-INDIAN ARTIFACTS

Practically all the unbroken fluted points from the Williamson site are small and average about 45 mm. in length. The broken basal portions, however, of other points reveal that they sometimes attained 100 or 120 mm. in length. The points can be divided into two main shapes: (1) points which have straight sides from the base to within one-half to two-thirds of the distance to the tip, and (2) points whose sides are concave just below the base

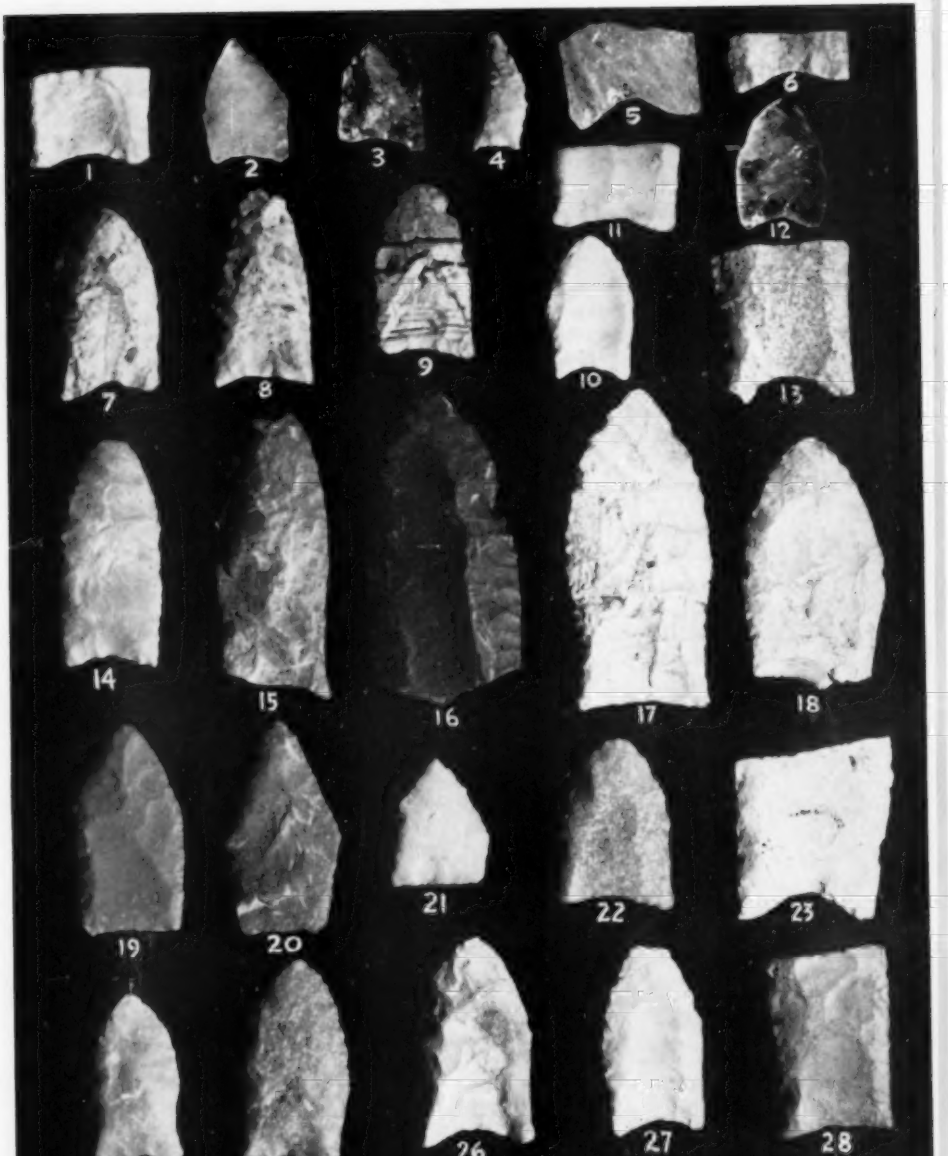

FIG. 8. Folsom implements from the Williamson site, Dinwiddie County, Virginia. *1-18, 22-28,* eastern variant of Folsom points; *19-21,* pentagonal points.

and which become slightly to decidedly convex at or near the middle. The bases vary from 1 to 5 mm. deep and have an average base-depth of 2.5 mm. Twenty-one of the 33 points reveal smoothing around the basal extremities. The longest flute on any of the points is 58 mm., and the widest is 18 mm. On some of the points the flutes are very short and on others only two or three short scars served for basal thinning.

Twenty-five of the fluted points are shown in Figure 8, *1-18, 22-28*. One point (Fig. 8, *4*) has one face which shows no work on the original plane surface and only a few flakes were removed from the opposite face to complete the point. Two others (Fig. 8, *10, 28*) have fine secondary chipping along the edges. Two points (Fig. 8, *1, 2, 5*) are made of white quartz while 3 others (Fig. 8, *22, 25*, and a third not shown) are of brown and grey quartsite. All were found on the site. This is a rather high percentage for this material because of the 185 fluted points found in Virginia, not over 8 have been reported of white quartz or of quartzite. Early man in Virginia made very little use of quartzite in comparison with flint and chert and a few other finer materials. There are 2 points (Fig. 8, *3, 12*) which are made of crystal quartz or rock crystal as it is sometimes called. This material is scarce on all sites in Virginia and the survey has uncovered only 10 fluted points made of it.

The number of end or snub-nosed scrapers is unusually large; 172 have been found. These are exemplified in Figure 9, *1-13*. The majority of these scrapers are trapezoidal in shape. Some are triangular, a few are square and several are oval. They range in length from 10 mm. to 50 mm. The average length is about 25 mm. The thickness of the working edge varies from 4 mm. to 11 mm. The width of the working edge varies from 15 mm. to 28 mm. A small number of the triangular form show chipping on all the edges. The remainder reveal chipping only on the nose or working edge. There are some scrapers which have at each side of the nose a small notch which forms a spur or sharp point which could have served very efficiently as a graver. All the scrapers are of the same chert material from which most of the fluted points are made. The occurrence of such a large number of snub-nosed scrapers on one site is of some significance. They are not frequently found in Virginia, and I do not know of an Indian site where they have been recovered in any comparable quantity. At the present time it seems that snub-nosed scrapers occur in large numbers in those sections of the State which have the greatest concentration of fluted points.

Side scrapers (Fig. 9, *14-16, 19*) do not occur on the site as frequently as do the snub-nosed form. Twenty-six have been recovered. They are made from medium to large flakes and the secondary chipping is largely confined to one edge.

Several implements (Fig. 9, *17, 18, 20*) could have served as drills or awls. Only 3 implements resemble somewhat the gravers reported from western Folsom sites. It is probable that further work on the Williamson site and other early man sites in Virginia and elsewhere might prove that gravers were adjuncts which were not as important in the eastern Folsom as in the western Folsom-complex.

Eighteen implements (Fig. 9, *21-23, 27, 28*), practically all of which are broken basal ends, should probably be called knives. Their bases are usually wavy. This feature proves doubtless the previous existence of a platform from which the longitudinal flakes were struck. In all but three examples flutes were struck from each face to thin the basal portion. The flutes average at least 40 mm. to the point of breakage, and one attains a width of 25 mm. It is evident that they were struck off after the flaking process had been practically completed because several of these implements (Fig. 9, *27, 28*) show clearly that the flutes, instead of breaking upward as the maker intended, turned downward and broke completely through the blade forming an entirely smooth surface along the break. Nearly all the specimens show retouching along the edges. Not a single one reveals smoothing around the basal end.

Six implements (Fig. 9, *24, 25*), probably small knives, have bases which range in shape from slightly convex to oval. The workmanship varies from very good to poor. Only two specimens show any attempt at fluting. There are many broad blades (Fig. 9, *26*) of different shapes and sizes which were made from large flakes and cores. They are percussion flaked and crudely made tools. The rather large quantity would indicate that they were important to the early inhabitants. Many flakes could have served as scrapers or as knives. In

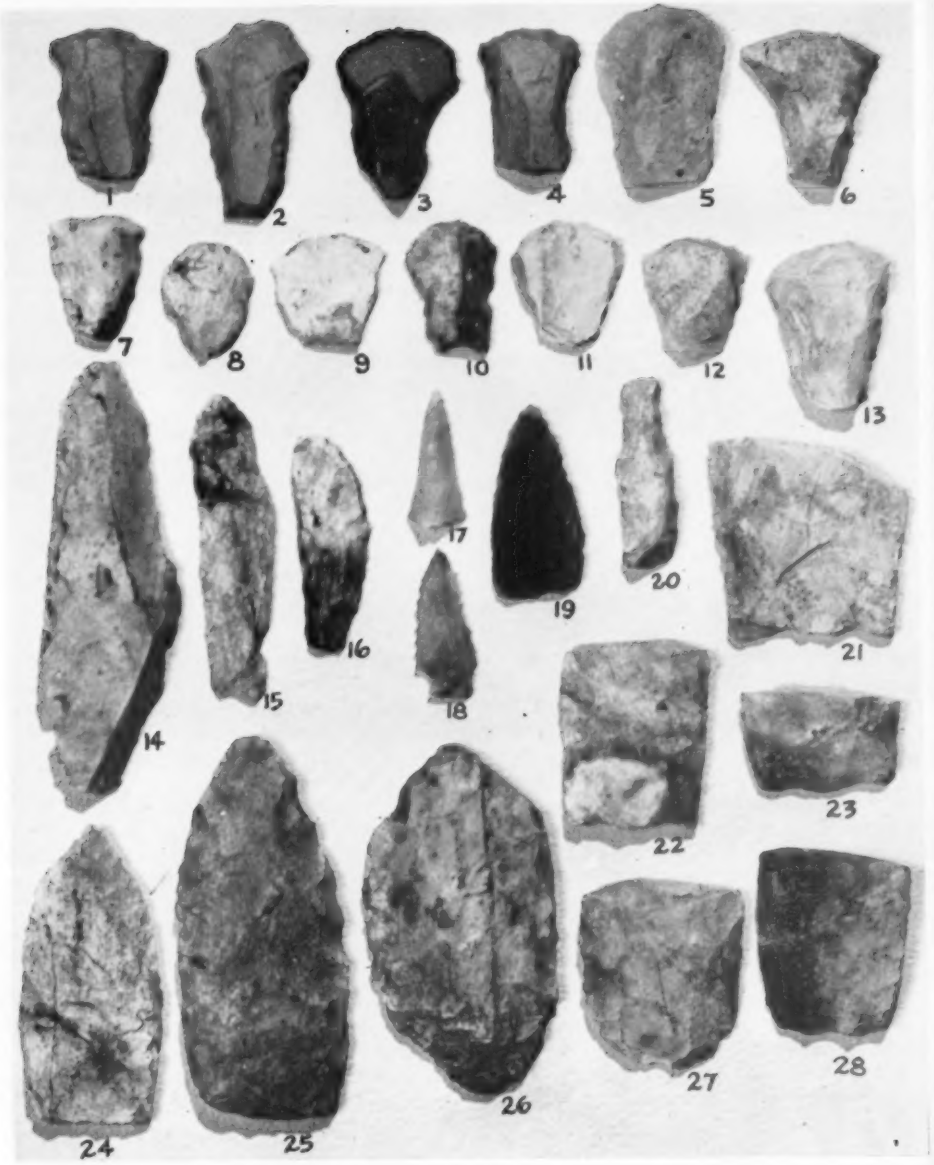

FIG. 9. Folsom implements from the Williamson site, Dinwiddie County, Virginia. *1-13*, snub-nosed scrapers; *14-16, 19*, side scrapers; *17, 18, 20*, drills; *21-23, 27, 28*, large fluted knives, wavy bases; *24, 25*, small knives, slightly convex to oval bases; *26*, blade made from large flake.

some cases their edges show distinct signs of having been used. On these flakes as well as on the cores there occur occasionally long narrow flutes which resemble those struck from the faces of the fluted points.

Two points (Fig. 8, *19*, *20*) should be classified as pentagonals. The face of one of these (Fig. 8, *19*) retains the plane surface of the original flake with some retouching only along the edges. The opposite face reveals a long shallow flute which extends about two-thirds of the length of the point. The other (Fig. 8, *20*) has no flutes. Both points are made of green chert and have practically the same size. They are 45 mm. long, and in width one is 25 mm. and the other is 23 mm. In thickness they do not exceed 3 mm. The edges are carefully retouched and the surfaces are nicely flaked. A third specimen of quartzite (Fig. 8, *21*), might belong in the pentagonal classification. It shows, however, some indications along one edge of having been broken and reworked. Therefore, its somewhat pentagonal shape could be considered accidental.

No one knows where the pentagonal belongs in the eastern cultures. Bushnell (1935, pp. 35-6) attributes it to an early culture and notes that "examples have been discovered in the northwestern part of Louisiana where many Folsom points have likewise been found." This seems to be also true in Virginia. More pentagonal points have been found in Mecklenburg County than in any other part of the state to my knowledge. In one private collection there are slightly over one hundred of these points which were found in that county (Robertson, 1947, p. 7). The apparent association of the fluted and pentagonal points might suggest that the latter type is associated with an early culture.

OTHER ARTIFACTS

An interesting feature of the Williamson site is that it has yielded over the years approximately one hundred and seventy-five projectile points which bespeak a later horizon than the fluted points. Various sizes and forms are represented, such as: stemmed, bifurcated, triangular, and basal notched. With the exception of six arrowheads of chert found on the periphery of the site, all the presumably late projectile points are made of white, brown and grey quartzite. Only one of the arrowheads of chert is distinctive. It is a nicely chipped, heart shaped point which belongs to the deep basal notched group which is rare in Virginia. The list of these implements is completed by two hammerstones of quartzite. They are formed of quartzite pebbles about four inches wide and two inches thick with well defined pits on the opposite surfaces. No pottery fragments of any kind have been found on the early man site proper.

It should be pointed out that most of the neo-Indian implements have been found on the eastern edge of the early man site. They may originally have been brought from a late site located about one half of a mile to the east. Quartzite occurs on this latter site in sufficient quantity for making numerous implements but it is, as already stated, extremely rare on the early man site. It seems possible that when the neo-Indian came in, centuries after early man (Miller, 1950, p. 286), and hunted over the latter site he was not aware of the large source of chert under his feet. Otherwise he would have made greater use of it as he did when he was lucky enough to find it elsewhere in Dinwiddie County.

SUMMARY

The Williamson site is the first site in Virginia from which sufficient evidence has been recovered to justify its classification as a definite early man workshop site.

Several other sites in Virginia have been labeled "possible Folsom sites" because they have not produced enough evidence to term them otherwise (Miller, 1947, pp. 15-6, 28-9; 1950, pp. 273-88; Bushnell, 1940, pp. 1-14).

The large number of snub-nosed scrapers, which are essentially campsite implements, and the abundance of widely scattered cores and flakes lead to the logical assumption that the workshop site served also as a campsite for early man.

Implements of both early man and neo-Indian occur on the site, but the proof is conclusive that the neo-Indian brought his quartzite points with him and lost them occasionally on the periphery of the early man site.

It is now possible for the first time in Virginia to study a large number of fluted implements found on the same site in various stages of the flaking process.

Prior to the discovery of the Williamson site the fluted point was the only implement found in Virginia which could be recognized as be-

longing to the eastern variety of the Folsom. Henceforth we shall be able to recognize also one kind of knife (Fig. 9, *21-24, 27, 28*) as very distinctive. This type is characterized by good flaking, well-defined grooves, and wavy bases. A straight base is also sometimes found in this group.

Early man workshop sites will be difficult to determine with absolute finality in Virginia if the Williamson site can serve as a criterion. It will require a tremendous amount of field surface work to accumulate the two distinctive implements in impressive numbers.

A large number of snub-nosed scrapers will likely be found on any early man workshop site.

The chances will be greater of finding an early man workshop site where chert and flint were available and used for making implements instead of quartzite.

Fluted points from the Williamson site vary considerably in size but fall into two general forms.

TABLE 1. DIMENSIONS AND DESCRIPTION OF FLUTED POINTS FROM THE WILLIAMSON SITE[1]

Field No.	Blade length	Max. width	Max. thickness	Length of flute one face	Length of flute opposite face	Flaking [3] fine good fair	Concavity of base	Material
1 [2]	21(1) (80E)	28	6	19(1)	19(1)	fine	medium	white chert
2	29	19	5	20	0	fine	medium	white quartz
3	26	18	6	12	0	good	medium	rock crystal
4	28	14	5	10	0	fair	medium	reddish chert
5	23(1) (90E)	29	6	12(1)	12(1)	fine	deep	white quartz
6	12(1) (75E)	27	5	9(1)	9(1)	fine	medium	bluish chert
7	44	23	7	21	8	fine	medium	bluish chert
8	45	21	7	15	11	good	medium	bluish chert
9	40	21	5	14	9	good	medium	dark grey chert
10	32	18	5	30	12	fine	medium	white chert
11	19(1) (75E)	27	6	17(1)	8	fine	medium	white chert
12	30	19	5	15	12	fine	medium	rock crystal
13	33(1) (90E)	29	9	30(1)	22	good	deep	brownish chert
14	50	22	5	8	0	good	medium	bluish chert
15	63	26	8	10	8	good	deep	green chert
16	70(1)	32	8	58	15	fine	(broken)	dark green chert
17	70	31	8	21	17	fine	slight	white chert
18	56	31	8	12	0	good	(broken)	white chert
19	37	23	6	22	11	good	medium	grey quartzite
20	40(1) (120E)	34	6	25	15	fine	deep	yellowish white chert
21	36	19	6	14	11	fine	slight	brown and cream chert
22	45	23	6	15	0	fine	medium	greyish red quartzite
23	45	24	6	16	10	fine	medium	brown and white chert
24	39	21	7	29	11	good	medium	cream chert
25	38(1) (75E)	27	7	36(1)	16	fine	slight	grey chert
26	65	28	8	16	11	good	deep	brown quartzite
27	44	23	6	25	13	fair	medium	brown chert
28	41	16	8	9	0	fair	slight	white and brown chert
29	50	22	5	15	12	fine	medium	black chert
30	35	24	5	0	0	fine	slight	brown chert

[1] Measurements in millimeters. (1) = to break. E = estimated.

[2] Measurements of points Nos. 31, 32, and 33 are not given because they consist only of that part of the blade below the middle to the tip.

[3] The number of flakes along the edges of the above points average 3-4 per cm.

The pentagonal point still presents an interesting problem.

A definite workshop site of early man or paleo-Indian has been found in Virginia at the Williamson site. Proper study and use of the body of evidence obtained will help in the location of additional sites, and thus increase the probabilities of obtaining stratigraphic evidence which will provide important clues to the age of the eastern implements which resemble some of those found at the Lindenmeier, the Clovis, and other sites in the West.

BIBLIOGRAPHY

Bushnell, David I., Jr.

1935. The Manahoac Tribes in Virginia, 1608. *Smithsonian Miscellaneous Collections*, Vol. 94, No. 8, pp. 1-56. Washington.

1940. Evidence of Early Indian Occupancy near the Peaks of Otter, Bedford County, Virginia. *Smithsonian Miscellaneous Collections*, Vol. 99, No. 15, pp. 1-14. Washington.

1940. Virginia before Jamestown. *Smithsonian Miscellaneous Collections*, Vol. 100, pp. 125-58. Washington.

Lewis, T. M. N.

1947. Mastodon Bone Artifacts. *Tennessee Archaeologist*, Vol. 3, No. 2, pp. 21-36. Knoxville.

McCary, B. C.

1947. A Survey and Study of Folsom-like Points found in Virginia. *Quarterly Bulletin, Archaeological Society of Virginia*, Vol. 2, No. 1. Richmond.

Miller, Carl F.

1947. *Preliminary Report of the Buggs Island Reservoir in Mecklenburg, Halifax, Charlotte Counties, Virginia; Warren, Vance, and Granville Counties, North Carolina.* Manuscript at the River Basin Surveys, Smithsonian Institution, Washington.

1949. Early Cultural Manifestations Exposed by the Archaeological Survey of the Buggs Island Reservoir in Southern Virginia and Northern North Carolina. *Quarterly Bulletin, Archaeological Society of Virginia*, Vol. 4, No. 2. Richmond. (Reprinted by permission from the Editors of the *Journal of the Washington Academy of Science*, Vol. 38, No. 12, December 1948. Washington.)

1950. Early Cultural Horizons in the Southeastern United States. *American Anitiquity*, Vol. 15, No. 4, Part 1. Menasha.

Pickle, R. W.

1946. Discovery of Folsom-like Arrowpoint and Artifacts of Mastodon Bone in Southwest Virginia. *Tennessee Archaeologist*, Vol. 3, No. 1, pp. 1-20. Knoxville.

Robertson, Arthur

1947. The Folsom Culture in Southside Virginia. *Quarterly Bulletin, Archaeological Society of Virginia*, Vol. 2, No. 2. Richmond.

Wells, Ross

1935. On Mecklenburg's Indian Trails. *Richmond Times Dispatch, Sunday Magazine Section*, December 1, 1935.

Woolsey, John M.

1950. Folsom-like Point from Saltville, Virginia. *Tennessee Archaeologist*, Vol. 6, No. 1, pp. 1-14. Knoxville.

Williamsburg, Virginia

December, 1950

STRATIGRAPHIC AND AREA TESTS AT THE EMERALD AND ANNA MOUND SITES*

JOHN L. COTTER**

THE EMERALD MOUND SITE

THE tests made at the Emerald mound site (MAd-5; also known as the Selzertown site) located on the proposed right-of-way of Natchez Trace Parkway twelve miles north of Natchez, Mississippi, were performed in order to salvage archaeological information and cultural materials along the route of roadway construction. The work was confined to two stratigraphic tests and one area test, the former on the primary mound and the latter in the area to the south of the primary mound assumed to have been a village site. By the area test it was hoped to demonstrate or disprove the existence of a village site associated with the great mound and to salvage data in the path of Parkway construction which was projected immediately south of the base of the primary mound. By the stratigraphic tests it was hoped that the cultural identity of the builders of the primary mound and the adjoining village site could be established.

The Emerald site is situated on a proposed relocation of Section 3-W of Natchez Trace Parkway which passes along the top of a ridge paralleling, and immediately south of, Fairchilds Creek in Section 41, R 1 W, T 8 N. Emerald mound is nine miles northeast of Natchez and one mile north of Stanton Station.

Although a residue of sherd material in the plow zone above undisturbed earth in the area south of the mound, and an even fainter trace to the north, give evidence of a village area entirely obliterated by erosion, the one feature identifying the site is the great primary mound, a truncated pyramid surmounted by a 30 foot secondary mound (now an irregular truncated cone) at the west end and a remnant of a mound now only five feet high at the east end. In measuring the primary mound, the 360 foot contour above sea level was taken as actual base line. The dimensions are as follows: Base, 770 feet east-west; 435 feet north-south; area 7.7 acres. Top of primary mound, 640 feet east-west; 345 feet north-south; area 5.0 acres. Height of primary mound, measured laterally at median points: South side, 27 feet; north side, 37 feet; west side, 35 feet; east side, 35 feet. The primary mound surface is approximately flat.

The western secondary mound is at present a sub-conical structure, truncated at the 410 foot contour with a maximum height of 30 feet above the surface of the primary mound. The basal dimensions north-south are 190 feet; east-west, 160 feet. There is a suggestion in the shape of this mound that the original proportions may have been rather pyramidal, and the possibility of a stairway or steep ramp up the east face from the primary mound surface is suggested.

Of the original secondary mound at the east end of the primary mound platform little remains but a five-foot crescent-shaped rise forming a continuous slope with the eastern side of the primary mound. The rise extends in a gentle curve northwest and southwest. There is little superficial evidence to indicate whether this mound was once conical, pyramidal, truncated, or domed. The probability is that this mound, which is known to have been partially excavated by Vincent Perrault in the latter 1800's, was low enough for cultivation on the primary platform to extend upon its slopes until continuous plowing reduced the fill almost completely, except for the rim portion at the edge of the primary mound surface.

The work of amateur and professional observers for more than a century (Sibley, 1803-4; Ingraham, 1835; Monette, 1838; Squier and Davis, 1848; Thomas, 1894; Brown, 1926; Moorehead, 1932) is too lengthy for review here. From their excellent records, however,

---

* Work reported here constitutes a unit of the program of the Archaeological Survey Project for the Natchez Trace Parkway, National Park Service.

** For assistance and cooperation acknowledgment is gratefully made: To the Mississippi State Highway Department for permission to work at Emerald; To Col. John H. Stowers, owner of the Anna site for his freely given permission to work there; To Supt. Malcolm Gardner and staff of the Natchez Trace Parkway, particularly Engineering Aide Holditch, for technical assistance; and to James A. Ford, James B. Griffin, Jesse D. Jennings, Alex D. Krieger, Philip Phillips, George I. Quimby, Albert C. Spaulding, and Gordon R. Willey for assistance with pottery typing.

it is possible to substantiate several important inferences about the original form of Emerald mound.

1. In the early 1800's the sides of the primary mound were impressively steep, "not more than thirty-five or forty degrees from a perpendicular." In 1948 the sides were between 60 and 70 degrees from a perpendicular. If the 1838 estimate of Monette were correct, such rapid erosion of the loess-detritus fill composing the slopes, even considering the fact that cultivation has been carried on during the past hundred years on the top and at the base, might indicate a relatively recent abandonment of the mound site, say in the 17th century. The lateness of the final pottery types, Natchez and Fatherland, in conjunction with a complete absence of European trade artifacts would support this inference.

2. The west secondary mound was more obviously a parallelogram in basal outline than now.

3. The baked clay dressing postulated by Sibley (1803-4) for the sides of the primary mound was probably rubble from wattle-and-daub structure walls that were erected laterally on the primary platform or on the flat tops of small lateral secondary mounds.

4. The so-called ditch at the foot of the primary mound was probably a borrow area for the fill of the secondary mounds and the trim of the primary mound.

5. Pottery from the surface to two feet below the sides of the primary mound is recognizably Fatherland or Natchez Incised and Manchac Incised, which corresponds to the predominance of these types in the most lateral fill and the detritus accumulation below the foot of the primary mound. The observation of shell-tempered sherds indicates an unidentified late type which could be Bell Plain or Parkin Incised.

6. The location of the finds of six limestone effigy pipes by Perrault (Brown, 1924, p. 256-64) may indicate coeval relationship with human burials at the western base of the east secondary mound.

Although the east secondary mound remnant was not included in the Parkway archaeological survey program, a brief test established the fact that a line of post molds in a trench ran north-south in the lower fill not over three

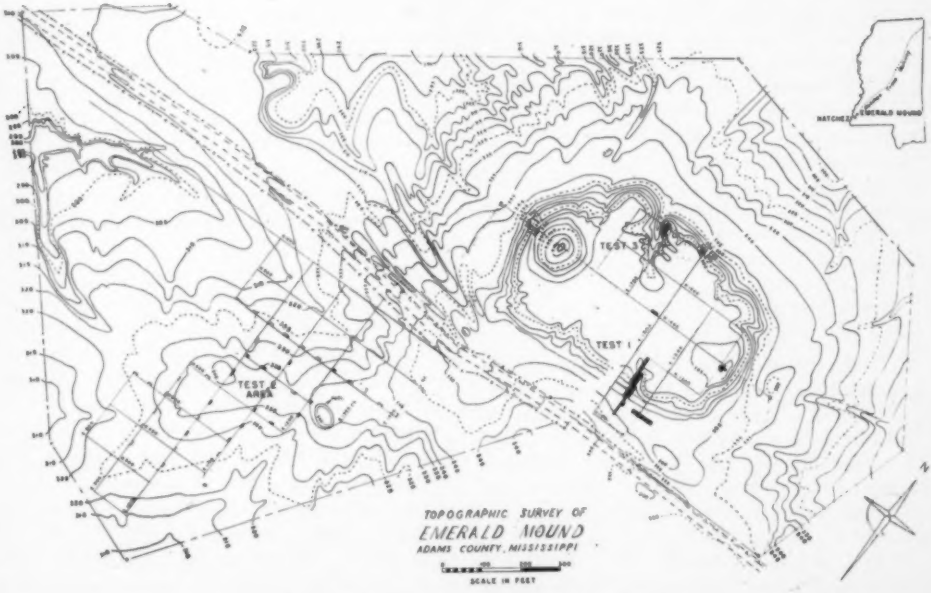

FIG. 10. Topographic map of Emerald mound.

feet above the present primary platform. The structure represented was developed before the mound was completed and was probably a typical Middle Mississippi structure subsequently covered by fill.

7. The ravines described as penetrating the north and south sides of the primary mound are certainly the gullies in which tests 3 and 1, respectively were made. The suggestion by Monette (1838) that these were covert ways or entrances seems unsupported by any real evidence.

8. Finally, the existence is established for at least four small lateral secondary mounds observed in 1838 to be two to three feet high, two located on the north and two on the south side of the primary platform. In 1948 there was a slight rise immediately west of the test 3 gully, located at the edge of the primary platform. No remnant exists today of a mound on the east side of the gully. No trace remains of either of the two secondary mounds said to have bracketed test 1 gully at the south side of the primary platform, although reed-impressed burnt clay occurred high in the test 1 cut indicating debris from a structure in the vicinity.

It is worth noting that test 3 revealed a remnant of a lateral secondary mound with extremely steep sides within the primary fill. This small mound, built at a stage when the primary mound was only partially complete, was later incorporated in the fill, the location having coincided with the present gully. At least it can be concluded that the erection of lateral secondary mounds began before the completion of the primary mound fill, and that lateral mound remnants were certainly observed on the primary platform in the first half of the 19th century.

Stratigraphy and Area Tests at the Emerald Mound Site

Of the three major tests made at the Emerald site, tests 1 and 3 were stratigraphic. Test 2 was a series of 5x10 foot pits at 50 foot intervals on the grid covering a 10-acre tract beginning 300 feet beyond the southwest corner of the primary mound. This test was intended to determine the extent and character of an assumed village site (see Fig. 10).

Test 1 included a 60x10 foot test trench 2 feet deep running E-W at the south base of the primary mound immediately east of a deep erosion cut in the fill. The gully itself was utilized for the main stratigraphic test consisting of a trench 170 feet long and 5 feet wide extending from 50 feet south of the primary mound base northward into the fill. A series of auger tests, some over 30 feet deep, continued across the width of the primary mound to give a profile of the fill in relation to undisturbed earth (see Fig. 11).

When the final profiles of test 1 in the primary fill were developed (and not before) the stages of construction became evident. These stages will be correlated with pottery type associations in the following analysis.

Test 3 was located in the erosion cut on the north side of the primary mound previously mentioned in a review of 19th century observations. This test was limited in extent and was intended chiefly as a check on test 1 data and to establish the presence and nature of corresponding fill on the north side of the primary mound.

Before offering sherd data from the tests it is necessary to state that in the entire site only four vessel units of plain clay grit were assembled from sherds: one small bowl in stage A, one medium-sized bowl in stage D, one small bowl and one small effigy bowl in the trim of test 1 gully — this despite exhaustive effort to match all plain sherds. The remainder of the plain clay grit sherds (some of which contain some charcoal admixed) are non-vessel pieces, and therefore cannot be taken to represent a numerical proportion of the plain vessels at the site. Even the many plain clay grit rims may well represent a good proportion of decorated vessels, since many pottery types at Emerald, like Manchac Incised, have the decoration placed well below the rim, and sometimes less than half of the vessel exterior is decorated. On the other hand, decorated sherds, which also were carefully inspected for matching, produced two unidentified punctate cups associated with stage A and one Fatherland and one Natchez bowl from the trim area—these from less than one-fourth of the total sherds in the test. The rest of the decorated sherds to which type names could be given represent vessels, some made up of several sherds. Only among the unidentified sherds are some pieces too fragmentary to represent the decoration of a vessel.

FIG. 11. Cross section of test 1, Emerald primary mound.

Pottery Analysis by Construction Stages

Test 1

Stage A. Beginning with the initial village deposit, the first definite occupation of the site was marked by the dark detritus-filled soil above undisturbed earth. Unfortunately, no refuse pits yielding cultural material were encountered here although three well-defined post trenches were located, all running east-west. In the village level alone 96 sherds were recovered, of which 84.59% were plain — 15% more than plain sherds in the drift. Decoration in the village era seems to have been characterized by brushing, which represented 50% of the total decorated sherds in the village, the balance being a few sherds of unidentified incising and unidentified punctate. Brushing diminishes in percent of decorated types per stage as the upper levels of the fill are reached, being represented in the drift by only 6.01%.

Stage B. This portion of fill lies upon the village deposit and extends from a triangular formation (possibly representing a rampart) northward to the center of the mound where undisturbed soil emerges at the surface. Stage B, with 147 sherds, has the smallest proportion of decorated sherds in the entire series of stages: 11.56%. Here, however, appears the first Fatherland Incised, representing 23.54% of the decorated sherds within the stage. Hardy Incised is present. Plaquemine Brushed declines to 47.06%.

Stage C. Subsequent to the well-defined deposition of stage B several less-easily interpreted zones appear: a thin remnant of an occupation, plus sandy deposits with clay lumps lying on a trace of wash, suggesting they represent a gradual filling in between stage B and the hilltop — perhaps from earth trimmed from the hill itself. Also included is a deposit of homogeneous loess fill so pure and free of village soil loads as to appear undisturbed country earth. This fill possibly represents the hilltop in its final stage of trimming at the summit.

With stage C, totalling 95 sherds, the decorated proportion rises to 18.95% shell-tempered. Bell Plain increases from a trace in stage A to 4.21% of the plain ware. Of the decorated sherds, Fatherland Incised and Anna Interior Engraved are again represented, although not strongly, and Plaquemine Brushed drops slightly to 44.44%.

Stage D. The final discernible remaining fill to be added to Emerald mound is the last extension of the south slope. This fill, with 273 sherds, contained much village soil and, therefore, may be fairly representative of the last village — probably outlying at a small distance south — to have fill borrowed from it. Stage D decorated sherds increase to 27.84%, the highest proportion of decorated sherds of all stages. Shell tempering is wholly absent in all sherds, plain and decorated. Of the decorated sherds, Manchac Incised appears in its strongest proportion: 35.53%. Fatherland Incised is next with 17.10%; Natchez Incised puts in its first appearance with a single sherd as does Parkin (subsequently Barton) Incised with two sherds. Maddox Engraved is present for the first time in relative strength, with 7.89%, while Plaquemine Brushed falls to 14.47%.

Stage E. The significant drift area of surface, plow zone and gully trim, has the greatest number of sherds at the site, 2,937, affording an excellent summary in percentages. Here decorated sherds represents 26.62%, shell-tempered plain is numerically insignificant, though present, Manchac Incised is the leader of decorated types with 31.33%, with Unidentified Exterior Incised next with 21.48%. Fatherland Incised is a strong 17.90%, and Natchez Incised — evidently a later type — rises to 9.33%. Maddox Engraved is next with 7.13%, and Plaquemine Brushed reaches its lowest ebb with 6.01%, suggesting that this type probably evolved as a follow-up of the early cording techniques of roughening the surface, then gave way to wet paste incising and ultimately faded out as more evolved smooth-line incising became fashionable.

Out of 377 plain rims 291 are straight, representing the preponderant form in the whole series. Other lip forms showed significant associations with certain stages. Those exclusively associated with the drift of stage E are: Exterior and interior lipped, outcurving, knobbed, exterior thickened and exterior horizontal line incised. Only two rim types beside straight are represented in the village stage A, interior horizontal line incised and folded, both of which also appear in the final stage E. Notched rims do not appear earlier than stage C.

A smaller proportion of decorated rims are straight than was observed in undecorated rims. However, the best represented rim type in the total of 206 rim sherds is uncurving, with 80; the next, outcurving, with 55. Folding occurs only on the lips of Manchac and Fatherland Incised, which are demonstrably late types, contemporaneous in development. Rim sherds showing the

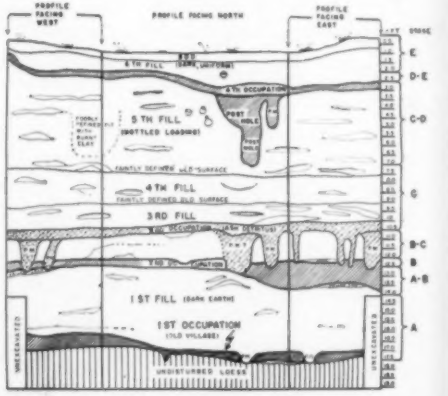

Fig. 12. Cross section of Anna mound 5 test.

forked eye motive are all straight. It will be noted that no decorated sherds are exterior horizontal line incised or exterior lipped — both found to a limited extent in Clay Grit Plain.

Test 2

Altogether, a total of only 76 sherds was recovered from forty-three 5x10 foot test trenches located in a 10 acre area south of the primary mound. All sherds occurred in the plow zone which rested directly upon undisturbed earth in every test. Whatever village occupation once may have existed upon this area, erosion of over a hundred years of intensive cotton cropping has obliterated every vestige of village features, leaving only small and worn sherds in the plow zone. The slight local concentration in the N-700 E-1110 area was accompanied by no other cultural remains. Clay Grit Plain percentage is 76.32, which corresponds with the Clay Grit Plain of the latest stages of test 1 (stage C, 76.84%, stage D, 72.16%, and stage E, 71.37%). Only one Bell Plain (shell-tempered) appears in test 2. The percentage of decorated sherds, 23.37%, corresponds with stage E, of test 1. The decorated ware types of test 2 clearly bear out the suggestion of late occupation. Manchac Incised, Fatherland Incised, and Maddox Incised lead the identifiable wares with Unidentified Incised 41.18%. Only one Plaquemine Brushed sherd was recovered.

Thus, the best explanation for the test area is that it was occupied only after the primary mound was built and the first village site beneath the fill on the original hilltop had long been abandoned.

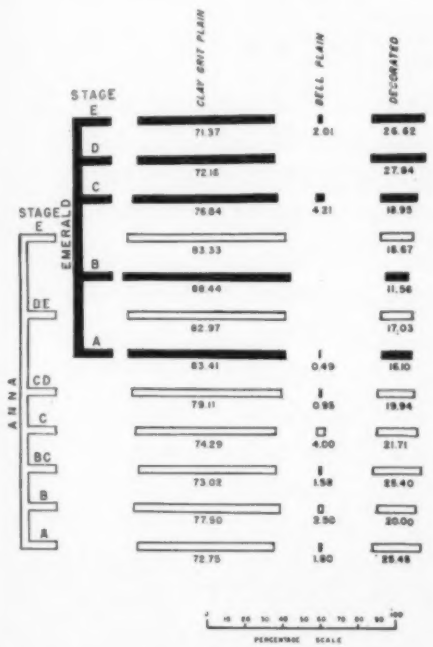

FIG. 13. Occurrence by stages of plain and decorated wares at Emerald test 1 and Anna mound 5.

Test 3

This test is located in the east side of the large erosional cut extending from the northwest border of the primary mound almost to the center. Here a 5-foot wide trench was developed into a vertical cut of 26 feet from the surface of the primary mound into undisturbed earth. The observations of fill characteristics are easily summarized, as are the data of the stratigraphic collection.

The profile of test 3 shows the fill resting from the 355 to 358 foot elevation on uneven undisturbed soil upon which lie pockets of dark village soil. The first fill above the village soil extends to 365, a thickness of 9 feet in places. Loading here indicates a slope downward from the northern edge of the primary mound to the center of the underlying hill. Resting evenly on the first fill is a dark occupation level less than 1 foot thick. On the first fill rests the fill of a secondary mound structure, the steep, even east slope of which appears in the end profiles of test 3. It is worth noting that this inclusive secondary mound provides a precedent for lateral secondary mounds observed in the 19th century. The final fill presumably begins on the first fill and on the steep sides of the inclusive secondary mound structure. Although the value of the stratigraphic data is greatly limited in test 3 by the scarcity of sherd material, the total of 193 sherds corresponds closely with the sherds of test 1 in the occurrence of types. Decorated sherds increase from none in the village deposit beneath the fill to 11.11% in the final fill; Manchac Incised occurs only in the final fill where Plaquemine Brushed diminishes; Incised sherds begin in the first fill and continue upward.

The only non-pottery inclusion in test 3 was a fragmentary lower human mandible in the village soil of zone 1 at the 357 foot level. No burial indication or association of artifacts was noted.

SUMMARY

The tests at Emerald demonstrate the following prime facts:

1. The primary mound was build on a natural hill which had first been the site of a village whose occupants built rectangular structures with wall posts set in trenches and used a relatively large proportion of plain pots. Of the decorated wares of this village zone, a little was incised or punctated, the majority of vessels being Plaquemine Brushed.

2. As the fill began to be deposited on the lower slopes of the hill, an earth rampart may first have been developed, followed by the filling in of the space between the rampart and the hillside. Finally, a mass of clean earth—possibly trimmed from the hilltop—was added, and lastly a quantity of village site debris was used to extend the sides of the primary mound. This fill contains more decorated ware, including an increasing amount of Fatherland, Natchez, and Manchac Incised, and less Plaquemine.

3. The drift at the foot of the south slope and the gully trim contained relatively more decorated wares, including much Manchac, Fatherland, Natchez, and Maddox Incised and miscellaneous types. Plaquemine Brushed ebbs to only a trace. In this final stage is the only indication of Southern Cult influence, manifested by Natchezan Forked Eye Incised. Thus, Emerald may have seen this phenomenon at the latest stage of occupation.

4. Test 2 indicated that an occupation of the latest aboriginal users of the Emerald mound was located on the gentle slope to the south. Crop erosion of the last hundred or more years has obliterated the village features, leaving only a residue of late pottery types.

Test 3, although it produced meager sherd evidence, provided a useful substantiation of the pottery type trends clearly implied at test 1. Test 3 also demonstrated the existence of secondary mound structures prior to the completion of the primary mound contours.

THE ANNA MOUND SITE

Because of its nearness to Emerald, the compact immensity of the site, and the suspicion that the site bore important relations to Emerald, limited sampling of the Anna site was undertaken. The only previously published effort to evaluate the Anna site is that of J. A. Ford (1936) who used 96 sherds collected at random from the surface of the vicinity of the four major mounds. Of this collection, generalized types were designated as follows: Natchez, 6; Tunica, 36; Coles Creek, 12; Unrelated, 42. The Natchez sherds were convoluted scroll 3-line incised, and are therefore Fatherland by present definition. The Tunica

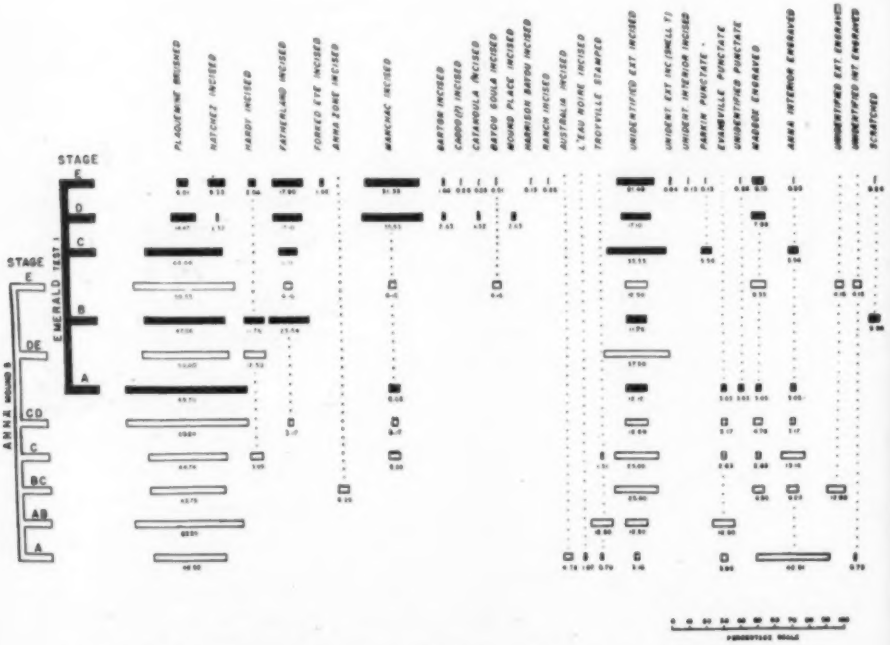

FIG. 14. Occurrence by stage of decorated types at Emerald test 1 and Anna mound 5.

sherds are characterized as 15 with incised "U-shaped flags" in a row parallel to the rim. Twenty-one sherds were evidently rims of otherwise plain ware characterized by incising and shallow notching of the lip. Of the 12 Coles Creek sherds, all have incised features arranged parallel to vessel lip and half have punctations. Those sherds are not illustrated, and the type remains somewhat dubious today. The unrelated sherds are interesting inasmuch as 27 are recognizably Plaquemine Brushed, 3 are Manchac Incised, and 12 are probably Anna Interior Engraved. All except the Tunica sherds are types recognizable in the present stratigraphic study. Some of the unidentified sherds from the mound 5 stratigraphy test illustrated in the present report suggest the Tunica sherd in Figure 22, p. 117 of Ford (1936).

During November and December, 1948, a stratigraphic test was made at mound 5 of the Anna site, MAd-1. This test consisted of a vertical 5x10 foot pit in the south wall of a 10 foot trench silo which extended roughly east and west across mound 5. This silo had been dug by Colonel John H. Stowers, owner of the site, several years previously. Through the courtesy of Colonel Stowers we have fragments adequately representing 13 whole pots which were obtained in the digging of the silo trench and were freely made available for observations and photographing. Since the bottom of the silo trench was an average of 10 feet below the surface of the mound, the placement of these pots can be limited in the stratigraphic picture to the upper two-thirds of the mound fill and definitely above the old village and first fill level, designated zone A in our stratigraphic sequence. Although not included in the stratigraphic test statistics at mound 5, the 15 whole or partial vessels obtained by Stowers make a useful and significant reference in the present study. On the diagram of the test it will be observed that the bottom of the silo trench was consistently above zone C of the stratigraphic test. Assuming the construction stages shown by the test to be fairly consistent throughout the mound, we may reasonably designate the silo trench vessels as coming from somewhere between the surface and the base of stage C. Stowers definitely states that the vessels here considered were all found high in the fill. In view of the fact that the 4 whole pots recovered in the stratigraphic test all came from stage C-D and stage E (a fifth vessel from B-C was only 60% complete), it is

FIG. 15. Test 1 showing exploratory trench in drift area at base of mound. Main trench is under canvas shade. West secondary mound visible in background.

FIG. 16. *1*, Manchac Incised, from stage D; *2*, Fatherland Incised, plow zone; *3*, Fatherland Incised, stage D; *4*, Fatherland Incised, stage D; *5*, Forked Eye Incised (Natchezan), plow zone; *6*, Forked Eye Incised (Natchezan), plow zone; *7*, Natchez Incised, plow zone; *8*, Natchez Incised, stage E; *9*, Natchez Incised, plow zone; *10*, Barton Incised, stage D; *11*, Caddo (?) Incised, plow zone; *12*, Caddo (?) Incised, stage E.

probable that the Stowers collection was originally distributed from the fill of C-D up to the surface, and is, therefore, relatively late in the mound construction. In the 15 specimens in the Stowers collection are 1 clay grit plain with scratching, 3 clay grit plain, 4 Fatherland Incised, 4 Natchez Incised, 2 Manchac Incised, and 1 Maddox Engraved.

Pottery Analysis by Construction Stages

Stage A. This is the most significant single stage in the test, since it represents the uneven basal village deposit and the first fill above it, which is almost certain to have been gathered from sources containing cultural material no later than this same village deposit. Both basal deposit and fill are rich in sherd material. In this stage clay grit plain ware drops to its lowest percentage in the test, 72.75% with Bell Plain represented by 1.80%. In the relatively large amount of decorated specimens, Plaquemine Brushed is somewhat less numerous than above with 42.52%, while Anna Interior Engraved is 42.51%. Thus, these two types are definitely the major decorated wares at the inception of the Anna site. The only other decorated types represented are Australia Incised, L'Eau Noire Incised, Troyville Stamped, and Evansville Punctate, with some unidentified exterior incised and unidentified exterior engraved pieces present.

Stage A-B. In this sparsely-represented contact stage, 77.50% of the sherds were clay grit plain. The only decorated type present in relative quantity was Plaquemine Brushed.

Stage B. Unfortunately, the excavation of stage B and stage A-B below it was interrupted by torrential rain that flooded the excavation. When the pit was bailed out, the muddy consistency of the earth made it impossible to sift carefully all the earth. Hence, some sherds were undoubtedly lost, which explains the relative scarcity of material here. Stage B yielded only 5 sherds, 4 of which were clay grit plain and 1 Plaquemine Brushed.

Stage B-C. Several post trenches intruded from C into the fill above the second occupational level making it necessary to establish stage B-C. Here the proportion of clay grit plain again dropped slightly, while Bell Plain also diminished. Of the decorated sherds, 43.75% were Plaquemine and 25.00% were unidentified exterior incised. However, the numbers of all decorated sherds but Plaquemine Brushed are too small here to be very significant by themselves.

Stage C. This stage comprises a definite occupational stratum between 10 and 10.5 feet from the surface and the uniform fill above it to the intrusion of stage D. Here the clay grit plain continues diminishing, to 74.49% of the total sherds. Shell-tempered Bell Plain rises to 4.01%, its best showing in the whole test. Of the total of decorated specimens, Plaquemine Brushed diminishes somewhat from the proportions of that type in higher stages, and Anna Interior Engraved elsewhere represented only in C-D (and meagerly there), jumps to 13.33%. Manchac Incised is next with 6.66%. A large proportion of unidentified exterior incised is indicated by 25.33% of the decorated wares.

Stage C-D. The intrusion of a large 4-foot post trench and a small 2-foot trench from stage D into stage C resulted in a very thick contact stage here. In this contact stage begins the progressive drop in the percentage of clay grit plain with the introduction of the first trace of shell-tempered Bell Plain. Of the decorated types, Plaquemine Brushed is dominant with 69.84%. Six other decorated types are represented in small proportions, the largest being an unidentified exterior incised type with 12.69%. Fatherland Incised is not found below this stage.

Fig. 17. *1*, Unidentified Interior Incised from contact stage B-C; *2*, Ranch Incised, stage E; *3*, Anna Interior Engraved, stage C; *4*, Maddox Incised, stage D; *5*, Unidentified Exterior Engraved, contact stage A-D; *6*, Scratched, stage B; *7*, Evansville Punctate, contact stage A-B; *8*, Barton Incised, contact stage A-D; *9*, Unidentified Punctate, contact stage A-C; *10*, *11*, Plaquemine Brushed, stage D; *12*, *13*, Plain Clay Grit rim: Straight, stage E; *14*, *15*, Plain Clay Grit rim: Horizontal line incised; stage A; *16*, Plain Clay Grit rim: Straight, stage C; *17*, Plain Clay Grit rim: Folded, stage D; *18*, Plain Clay Grit rim: Interior lipped, plow zone; *19*, Plain Clay Grit rim: Exterior lipped, plow zone; *20*, Plain Clay Grit rim: Folded, plow zone; *21*, *23*, Plain Clay Grit rim: Notched, stage E.

Stage D-E. Due to the irregular location of stage D, the contact of this occupational level with the fill above could be represented by only one block, designated stage D-E. Here the percentage of plain clay grit is relatively large, plain shell-tempered sherds are absent, and decorated sherds are too few to be significant.

Stage E. In stage E, the topmost, partly-disturbed stage, clay grit plain sherds are somewhat above the average in the whole test, but shell-tempered plain is absent. Plaquemine Brushed leads with 58.33% of all decorated wares, with unidentified exterior incised next with 12.50%, followed by Maddox Engraved, 8.33%. Present but unimportant numerically are Fatherland Incised, Manchac Incised, Bayou Goula Incised, unidentified interior and exterior engraved. Significant absences are noted for Anna Interior Engraved and Evansville Punctated.

Most striking is the fact that no straight plain rims were encountered at the Anna test. Of the total of 86, the folded rims appeared late, from stage C onward, while interior thickened and slightly everted characterize stage A. Interior thickened was less numerous in the higher stages. Interior horizontal line incised appeared most numerous in C-D and C, and was absent in A through B. Of the 104 decorated rims, the largest proportion was outcurving, and characterized Plaquemine Brushed, Manchac Incised and unidentified Exterior Engraved. Half of the Anna Interior Engraved rims were outcurving, and half interior thickened or straight. The remaining types had too few rims represented to show positive trends in rim shape.

FIG. 18. Restored vessels from Emerald test 1. *1*, Natchez Incised. Small Bowl (from non-stratified wash and trim areas at mouth of gully); *2*, Fatherland Incised, Small Bowl (from non-stratified wash and trim areas at mouth of gully); 3, Clay Grit Plain. Small Shallow Bowl (from non-stratified wash and trim areas at mouth of gully); 4, Clay Grit Plain. Small Effigy Bowl (from non-stratified wash and trim areas at mouth of gully); 5, 6, Two Unidentified Punctate Cups (from contact stage A-C and from stage A).

Although Figure 13 shows sherd percentages by level, the combined figures can be summarized thus: Of the total of 2 plain wares, 11 decorated types, and miscellaneous unidentified exterior incised and unidentified exterior and interior engraved sherds, the following percentages are listed for all stages together: Clay grit plain, 76.07%; Bell Plain (Shell tempered), 1.91%; and Decorated (all types), 22.01%. The grand total of plain sherds, decorated sherds and whole pots, was 1,461.

Percentages of 320 total decorated specimens are:

Fatherland Incised	0.93%
Anna Zone Incised	0.31%
Manchac Incised	2.48%
Hardy Incised	1.24%
Australia Incised	1.86%
L'Eau Noire Incised	0.62%
Bayou Goula Incised	0.31%
Unidentified Exterior Incised	13.04%
Anna Interior Engraved	20.81%
Maddox Incised	2.48%
Unidentified Interior Engraved	0.31%
Unidentified Exterior Engraved	1.24%
Evansville Punctated	3.11%
Troyville Stamped	1.62%
Plaquemine Brushed	50.62%

Thus, of all the decorated sherds, half are Plaquemine Brushed, making this the dominant type of decorated ware for the site. As will be seen from the following analysis, this type also dominates each stage. The only other type of numerical significance is Anna Interior Engraved which is most heavily represented in the lowest stage.

In figures and tabulations the types Fatherland Incised and Anna Zone Incised are mentioned. Tentative type descriptions follow:

Fatherland Incised is characterized by interlocking scrolls, not separated by zones. The scrolls are flowing and the cursive design usually involves two to four line elements whirling into a small circle from which a second set of lines evolves and flows to another nucleus. Both bowls and bottles are so figured. Incised decoration extends well over the body of bowls from the lip line well toward the flattened base and from the neck junction of bottles to the flat base itself. The paste varies from uniform tan to tan mottled with dark clouds, hardness 2.5 to 3.0, tempering, fine clay grit.

Coiling method of manufacture is indicated, although the clay is well-compacted and no coil fractures were observed in the Anna specimens, except possibly at the juncture of the neck on a bottle. The bowl is illustrated in Figure 22.

Anna Zone Incised is a tentative type which has been designated only because the vessel representing the type seems unique in its zoned design, although the relationship to Natchez Incised is apparent in paste, color, and technique of design application. The design consists of panels of curvilinear parallel lines, six to nine in number, which start at the lateral borders and flow half way round a small oval, interlocking with a complementary series of parallel lines curving to the opposite edge of the panel. Only a bowl form was observed, and the decoration is from the rim line to a line circling the base. The paste is clay grit, fine; the vessel surface is well-burnished; color is mottled dark gray. Coil manufacture is indicated, and hardness is 2.5 to 3.0. The bowl has slightly incurved sides and a broad flat bottom (Fig. 21, 5).

SUMMARY

The stratigraphic test at mound 5 of the Anna site indicates that clay grit plain ware, though numerically dominant among all types of vessel and non-vessel sherds, was less numerous at the basic village level and inception of the mound. Bell Plain, virtually the only shell-tempered ware, is present below stage D only. Although not enough whole vessels could be observed to make more than a guess, it is reasonable to assume that at least one-quarter of any decorated vessel would be plain on the average. Thus, the proportion of undecorated sherds can be scaled down accordingly. Probably the early inhabitants of the site made about half their vessels without decoration, and the later people made somewhat fewer decorated wares.

Decorated wares are strongest numerically at the lowest or basic stage A, with 25.45% of all sherds in the stage. Plaquemine Brushed is dominant at all levels from bottom to top, but seems to diminish slightly at the basic level, where Anna Interior Engraved is strongest. Anna Interior Engraved is absent from the topmost stages. Hardy Incised appears only above zone B and Fatherland Incised only above stage C. Maddox Incised is absent below B-C, as is Anna Zone Incised.

If the evidence of the Stowers collection, known to have been obtained above stage B, is considered, Fatherland Incised and Natchez Incised were present, probably in a late stage of the building of mound 5. It is a curious fact that no recognizable sherds of Natchez Incised were found in the stratigraphic test, although some unidentified exterior incised sherds might fit into this category if they were vessel specimens with coherent designs. Most "unidentified" decorated sherds were too small to permit positive typing.

There is nothing to indicate that Anna mound 5 is historic. No European or colonial trade materials were recovered or reported. Nor is it certain that historic Tunica wares are present, although Caddo is suggested. Since no cultural material except sherds or whole pots were encountered in the test, a qualitative or quantitative analysis of the material culture as a whole is not involved.

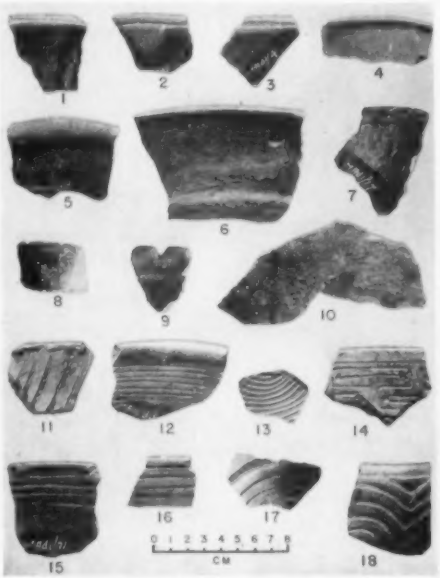

FIG. 19. Sherds from Anna site. *1*, Plain Clay Grit rim: (horizontal line incised); *2*, Plain Clay Grit rim: (horizontal line incised); *3*, Plain Clay Grit rim: (Folded); *4*, Plain Clay Grit rim: (interior lipping); *5*, Plain Clay Grit rim: (interior thickened); *6*, Plain Clay Grit rim: (exterior lipping); *7*, Plain Clay Grit rim: (notched); *8*, Plain Clay Grit rim: (notched); *9*, Plain Clay Grit rim: (notched); *10*, Bell Plain (shell tempered); *11*, Manchac Incised; *12*, Hardy Incised; *13*, Bayou Goula Incised; *14*, L'Eau Noire Incised; *15*, Australia Incised; *16*, Australia Incised; *17*, Unidentified Exterior Incised; *18*, Unidentified Exterior Incised.

CONCLUSIONS

1. From the graphs summarizing type percentages (Figs. 13 and 14) it can be assumed that the basic village horizon at Anna is precedent to the corresponding underlying village level at Emerald. This estimate is based principally on the indication that Plaquemine Brushed reaches its maximum midway in the Anna sequence of stages, while the same type at Emerald is strongest in the underlying village. There is also the increasing evidence of Manchac, Barton, Fatherland, and Natchez Incised wares in the late stages of Emerald. A strong representation of Anna Interior Engraved in the Anna stage A thereafter diminishes in the upper levels of the mound 5 test, while this type is weakly evidenced at Emerald. Another indication of the earlier horizon of the Anna site is the representation of Evansville Punctate, a Coles Creek period associate, in the old village at Anna and its subsequent diminishing in higher Anna stages, with only a trace in the basic village stage at Emerald. Australia Incised, L'Eau Noire Incised, and Troyville Stamped, all appear in the first stages of Anna only and are absent at Emerald.

2. The position of both Anna and Emerald sites is in the Plaquemine-Natchez horizon, beginning in late Coles Creek period with a trace of Troyville influence and well above the Marksville and Tchefuncte periods. Although no historic contact was identified for either site, it is evident that Emerald extended well up toward the period of white invasion, possibly the 17th century, and the basic village at Anna is no earlier than early (though developed) Mississippi.

3. Although Coles Creek pottery is not definitely associated with Anna or Emerald, the period to which Coles Creek pottery belongs is clearly linked with Anna. The link which makes this association is the Plaquemine site.* Thus, the Chevalier Stamped of the Troyville-Coles Creek periods just reaches into Plaquemine but is not found at Anna or Emerald. Australia Incised and L'Eau Noire Incised are present in Plaquemine and Anna, while Bell Plain is common to both sites and Emerald as well. Troyville Stamped, which stems from Marksville, reaches a maximum in the Troyville period, fades in the Coles Creek period and vanishes in Plaquemine. This type, however, is found in the basic stages of Anna. Hardy and Manchac Incised, which have their roots in Troyville and Coles Creek, continue through Plaquemine, with Hardy culminating in late Anna, while Manchac reaches its maximum in late Emerald.

4. The relationship of the Emerald and Anna sites to cultural groupings in the Southeast is thus fairly clear. Here is presented the maximum achievement of the temple mound builders in the late Mississippi stage in the lower Mississippi Valley. A wide variety of pottery decorations was known and the major emphasis was increasingly upon incising, leading to engraving. The temporal horizon in

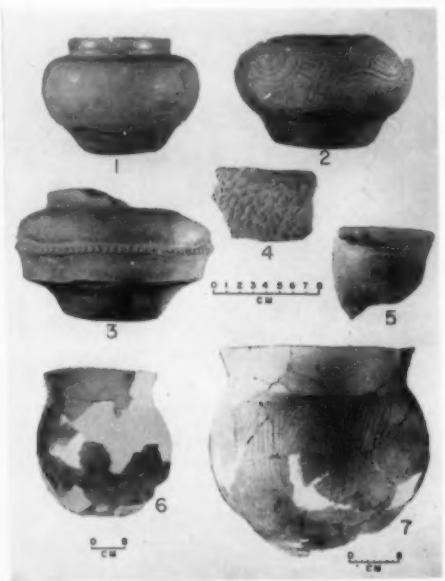

FIG. 20. Stowers collection from Anna mound 5. *Type*: *1*, Fatherland Incised, small bowl; *2*, Natchez Incised, small bowl fragment; *3*, Fatherland Incised, small bowl; *4*, Evansville Punctate, sherd; *5*, Fatherland Incised, sherd; *6*, Barton Incised, large pot; *7*, Manchac Incised, large pot.

* Since this report was written, the Coles Creek type site, located 10 miles north of Emerald mound, has been completely excavated by the writer for Natchez Trace Parkway and named the Gordon Site. Here the link between late Troyville and Plaquemine is Coles Creek and Hardy Incised giving way to Plaquemine Brushed and Manchac Incised.

which Anna and Emerald fit, with Anna occupying a somewhat lower position, beginning perhaps in the 15th century and ultimately merging with Emerald as the latter progressed to the end of the 17th century, can be correlated with the schematic presentation of Southeast cultural complexes tentatively worked out by the Southeast Archaeological Conference at Knoxville, October 1950, with information gathered by the Mississippi Valley Archaeological Survey and made available to the author by Griffin, Ford and Phillips, and with culture-chronology studies of Krieger (1946) and Stephenson (1950). The sequence of complexes occupying a comparable temporal horizon from west to east are Mississippi Valley: late Mississippi, ranging down through early Mississippi toward late Baytown. West Tennessee-North Alabama: downward through Moundville toward Obion. North Georgia-East Tennessee: Lamar, Savannah into Etowah-Dallas, toward Hiwassee Island. Augusta-Savannah Coast: Irene and Savannah. North Carolina: Pee Dee into Uwharie. Central Georgia: Lamar and Savannah into Etowah and toward Macon Plateau. South Georgia and northwest Florida: Leon-Jefferson, Fort Walton and Moundville, into Weeden Island II. Peninsular Florida: St. Augustine and Potano; Glades III C and III B into III A; Malabar II; St. Johns II C and II B into II A; Alachua into Hickory Pond.

5. It is also appropriate in this report to mention certain cultures and foci of the horizon comparable to Anna-Emerald in Texas, Oklahoma, Arkansas, and Louisiana. These include the Fulton aspect from Glendora through late Spiro, and possibly downward to reach the Gibson aspect at the time of middle Spiro, the Central Texas aspect, the upper part of the Panhandle aspect, and the Henrietta focus. In New Mexico, the Bravo Valley aspect in-

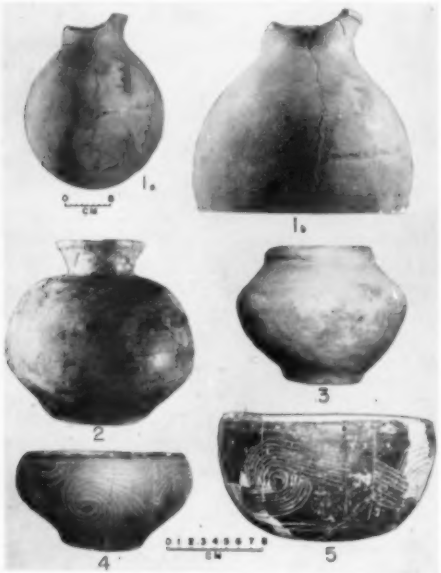

FIG. 21. Whole vessels from Anna mound 5. *Type*: *1, a, b,* Two views of Clay Grit Plain vessel showing faint scratching (Stowers collection); *2,* Maddox Incised, small water jar (Stowers collection); *3,* Clay Grit Plain small bowl showing possible erased incising (test mound 5); *4,* Fatherland Incised, small bowl, from test mound 5); *5,* Anna Zone Incised, small bowl (from test mound 5).

FIG. 22. Whole vessels from Anna mound 5. *Type*: *1,* Fatherland Incised, water jar (Stowers collection); *2,* Fatherland Incised, small bowl (Stowers collection); *3,* Fatherland Incised, small bowl (from test mound 5); *4,* Maddox Incised, water jar (Stowers collection).

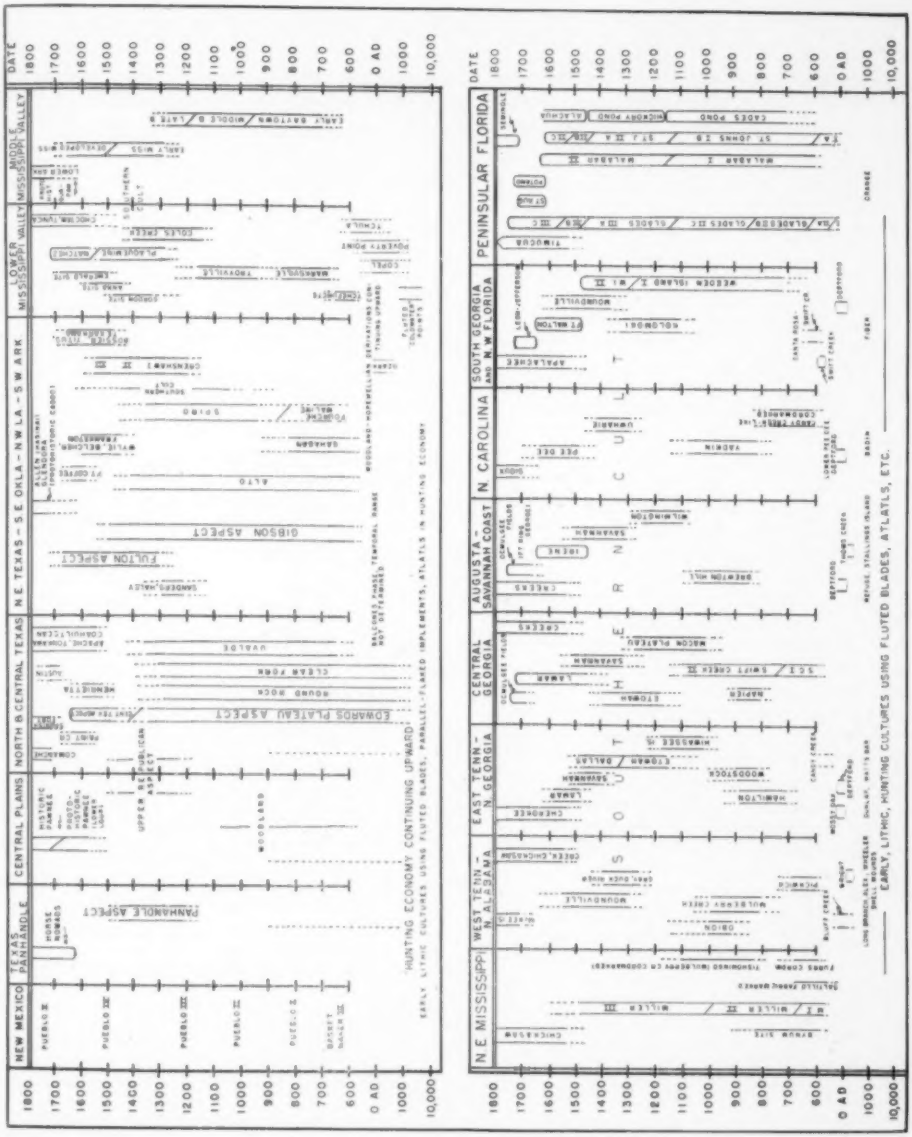

FIG 23. Chronological chart.

cluding Conception focus, and Pueblo IV represent temporal correlation with Anna-Emerald.

6. Although basic similarities are feasible in the ensemble of traits, ceramic and otherwise, in many of these units, those most closely associated with Anna-Emerald are specifically Plaquemine and Fatherland-Natchez, equating with early to late (Developed) Mississippi in the Memphis-Vicksburg area.

The culture-chronology chart which is presented with this report is intended to place the Anna and Emerald sites in temporal and cultural perspective, not only in the lower Mississippi Valley, but also in regard to the entire southern United States area east of New Mexico.

BIBLIOGRAPHY

Brown, Calvin S.

1926. *Archeology of Mississippi.* Mississippi Geological Survey, University, Mississippi.

Cotter, John L.

1949. *Archeological Survey of Emerald Mound.* Journal of Mississippi History, Vol. 11, No. 1, pp. 65-6. Jackson.

Ford, James A.

1936. *Analysis of Indian Village Site Collections from Louisiana and Mississippi.* Anthropological Study No. 2, Louisiana Department of Conservation. New Orleans.

Ford, James A. and Gordon R. Willey

1939. *Troyville Stamped.* In News Letter of Southeastern Archeological Conference, Vol. I, No. 3. Lexington. (Mimeographed)

Griffin, James B.

1946. *Cultural Change and Continuity in Eastern United States.* In "Man in Northeastern North America," edited by Frederick Johnson, Papers of the Robert S. Peabody Foundation for Archeology, Vol. 3, Phillips Academy. Andover.

Ingraham, J. H.

1835. *The Southwest by a Yankee.* Vol. 2, pp. 221-6. New York.

Krieger, Alex D.

1946. *Culture Complexes and Chronology in Northern Texas,* University of Texas Publication No. 4640. Austin.

Monette, John W.

1838. [An Account of an "Investigation" of Selzertown Mound] Southwestern Journal, I, pp. 189-91, 228-31. Library, University of Louisiana. Baton Rouge.

Moorehead, Warren K.

1932. *Etowah Papers,* Phillips Academy, pp. 161-3. New Haven.

Quimby, George I., Jr.

1932. The Natchezan Culture Type. *American Antiquity,* Vol. 7, No. 3. Menasha.

Sibley, John

1803–4. *Journal.* Unpublished MS at Mississippi State Department of Archives, Jackson. Reference to mound near Selzertown as having "remains of a wide ditch around it, the top of the face."

Stephenson, Robert L.

1950. Culture Chronology in Texas. *American Antiquity,* Vol. 16, No. 2, pp. 151-7. Salt Lake City.

Sydnor, Charles S.

1938. *A Gentleman of the Old Natchez Region, Benjamin L. C. Wailes.* Duke University Press. Durham.

Squier, Ephraim G. and Edwin H. Davis

1848. Ancient Monuments of the Mississippi Valley. *Smithsonian Contributions to Knowledge,* Vol. 1. Washington.

Thomas, Cyrus

1894. Report on the Mound Explorations of the Bureau of American Ethnology. *Twelfth Annual Report of Bureau of American Ethnology,* pp. 263-7. Washington.

Winans, William

1820. Autobiography, pp. 321-2 (MS unpublished) Proceedings of American Philosophical Society, Vol. 1, pp. 304-5; 307-48. Philadelphia.

Natchez Trace Parkway
National Park Service
Tupelo, Mississippi
August, 1950

BASKETMAKER III HUMAN FIGURINES FROM NORTHEASTERN ARIZONA

EARL H. MORRIS

HUMAN figurines in the Basketmaker III collections resulting from excavations in the Prayer Rock district of northeastern Arizona by the Bernheimer Expedition and Carnegie Institution of Washington are of two classes; those made of clay and those fashioned from vegetable substances. The former have been described from several localities. The latter have not been previously recorded. Of the clay variety there are, whole or fragmentary, 23 representatives; of the vegetal, 4.

Ranges of tree-ring dates for the group of sites from which this series was obtained have been announced by Douglass (1936, p. 33) as A. D. 477-684, and by Haury (1938, p. 3) as A. D. 473-646. The differences in the two statements may be attributed to the fact that the readings were made from two collections of wood samples which were not in all cases duplicates. These findings provide the basis for a generalization that figurines of the kinds herein considered were current during the two centuries from 475 to 675 A.D.

The wisdom of an attempt to separate the clay figurines into definite styles on the basis of only 14 complete specimens is questionable. It may well be that with a large enough series at hand there would be found all possible intergradations of what now seem to be rather distinctive characteristics. Nevertheless, to facilitate description, five styles will here be proposed. The majority, if not all, of the figurines represent females and presumably were fertility emblems. There are three, however, which bear no definitive sex characteristics. Customarily the figurines were made of surface clay. In no case is there evidence of intentionally added mineral temper and there is but one positive instance of the use of vegetable temper (Fig. 26, *f*). In this specimen there is an admixture of shredded juniper bark.

Of the 23, eleven (Figs. 24, *a*, *e-h*; 25, *a*, *c*; 26, *a-c*, *h*) passed through house fires and are variously smoked, some of them coal black. One (Fig. 26, *h*) was altered to gray pottery of good hardness, but because it was among the debris of an intense conflagration, there is no reason to attribute its present condition to anything except accident. Ten of the 12 not affected by chance burning are reddish brown in color; the other 2 of a grayish tone.

Style I. Oval wads of clay, longer than wide, broader than thick, the only definite modeled feature a relatively high nose ridge. There are two examples (Fig. 24, *a*, *b*, *b'*). The nose ridge was produced by pinching upward a portion of the body mass at the longitudinal center of one of the broader sides. In *a*, the area on both sides of and below the nose is slightly recessed. These are the simplest and crudest of the figurines. Mammary glands, the most conspicuous feature of Basketmaker clay figurines as a class, are not depicted in any way, hence there is no positive proof that they represent females. A strong suggestion of the practice of black magic is afforded by *b*, because of the presence of the stubs of, or holes produced by at least 25 cactus spines which were thrust deeply into the clay while it still was soft.

Style II. Elongated, flattish oval in cross section, without, or with only a suggestion of the crotch cleft. There are three examples (Fig. 24, *c*, *d*, *d'*, *e*). The smallest and simplest of these, *e*, is a flattened lozenge with a low nose ridge and short and shallow eye slits. The very shallow crotch cleft is not clearly discernable in the illustration because of breakage in the area of the right hip. Absence of breasts makes sex identification uncertain. In comparison, *c*, is much better done. The flattened body tapers toward the lower extremity. In the tip of the relatively massive nose, nostrils are represented by punctations, and beneath is a mouth groove. There is a mere suggestion of a crotch slit. In the pubic region an area of breakage at first suggests the former presence of modeled-on male genitalia. The conical breasts in high relief, the left now missing, argue against this and it is probable that the feature portrayed was a menstrual pad similar to those of corn leaf still retained by the vegetal figurines shown in Figure 27.

The third representative of style II (Fig. 24, *d*, *d'*), is thicker in proportion than the others and tapers pronouncedly from the head end downward. No crotch cleft is represented. The area around the nose is spattered with slender punctations, apparently intended to be in encircling rows. Across the upper half of the back there is a pattern consisting of two diagonal incised lines drawn vaguely parallel with a sloppy zig-zag of punctations running between them and an irregular row of the latter bordering the lower line.

Style III. Rectangular with rounded corners, flat to oval in cross section; nose and breasts in high relief, crotch cleft deep and conspicuous. There are four examples (Figs. 24, *f-h*; 25, *a*). In these, the breasts are placed just above the transverse center of the plate. In one

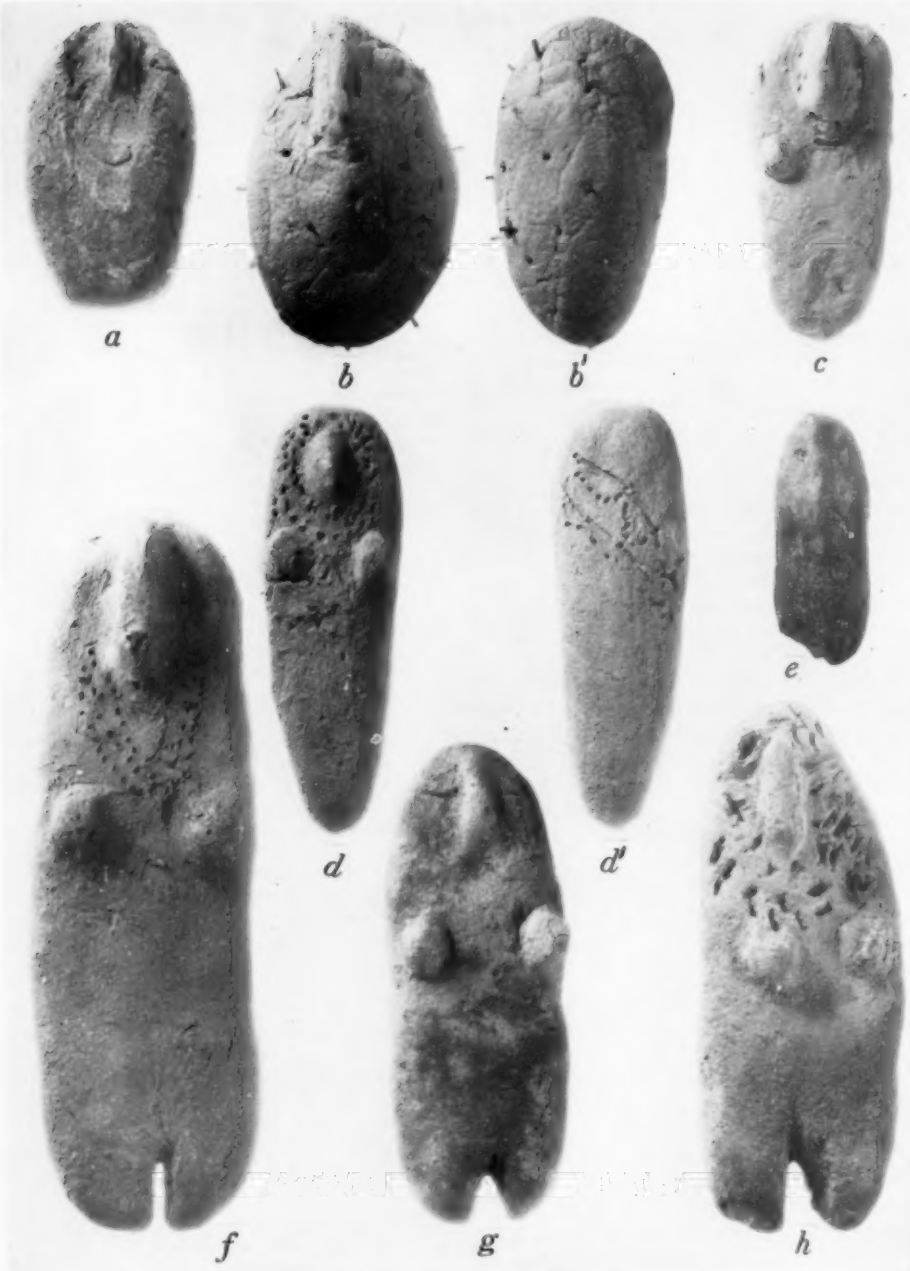

FIG. 24. Basketmaker III clay figurines. Style I, *a*, *b*, *b'*; style II, *c-e*; style III, *f-h*. Natural size.

instance (Fig. 24, *f*), the nipples are represented by punctations and on the same figure there are nostril pits at the lower end of the heavy nose ridge. Two (Fig. 24, *g*, *h*) have eye slits reaching out from above the center of the nose. On Figure 24, *f*, there is a triple-line punctate pattern pretty clearly intended to represent a necklace, and the entire area around the nose of *g* is occupied by deep gougings made by a coarse point applied with diagonal thrust. The crotch cleft varies from a slit with parallel sides (Fig. 24, *f*) to broadly V-shaped (Fig. 25, *a*). None of these have any sort of embellishment on the back.

Style IV. Distinguishing characteristic, a definite demarcation between head and body. There are six examples, four complete (Fig. 25, *b*, *b'*, *c*, *f*; Fig. 26, *a*), and two fragmentary (Fig. 25, *d*, *e*). These combine in various ways features characteristic of styles II and III. For instance, Figure 25, *f*, has a long body tapering toward the lower extremity like that of Figure 24, *d*, style II, and also lacks a crotch cleft. However, a blob representing the head, thicker than the body itself, is attached to the well modeled shoulders by a disproportionately thick but definite neck. A roughened area on the front of the abraded head marks the root of the usual massive nose. Punctate embellishment occupies much of the front of the figure. A necklace droops from the shoulders across the breast and from it hang two pendants. A double row of pits crosses in the line of the breasts, the nether one continuing beyond their lower edges to the margins of the figure. From beneath the left breast diagonally downward to the opposite side lies a design consisting of two series of triangles, base to base, but offset so that the tip of the plain V between two of those on one side bisects the base of a pitted one of the other row.

Because of very deep crotch clefts, Figure 25, *c* and Figure 26, *a* bear a close resemblance to the members of style III. The head of Figure 25, *c*, narrower and thinner than the body, has the usual nose ridge and also slit eyes. The trunk is nearly round in cross section and the breasts are extremely long, the left one nearly twice as large as the other. A single row of deep gouges portrays the necklace. Evidently Figure 26, *a* was modeled as a single plate, then pinched in at the neck region to leave a flat head nearly as wide as the body. The nose ridge has separated from the face with a clean fracture, showing that it had been appliqued to the basic plate. Eyes and mouth are slits. The necklace of tiny and very carelessly directed punctations crosses the tops of the square shoulders, whence both ends continue a short way down the back. Each nipple is a slender pit. The crotch cleft retains the charred strands of a fiber apron.

Better modeling is exhibited by Figure 25, *b*, *b'*. The head portion is thinned and narrowed, the torso curves inward at the waist line both at the sides and across the back and the truncated thighs curve sharply centerward. Again a ridge constitutes the nose. Eyes, breasts and navel are represented by pits. The mouth is a slit with a punctation at center and there is a single punctation, presumably to represent the nostrils. The crude belt and apron of untwisted fiber are still in place. The belt was put on before the figure dried as shown by the grooves where the individual strands pressed into the soft clay.

From the point of view of technique, the two fragmentary examples of style IV might be considered to belong to a distinct category because heads and bodies were modeled separately, then joined. The one in Figure 25, *d* is a thin, flat plate. Running downward from the concavity at upper center, there is a bore about 2.5 mm. in diameter which emerges at the center of the area where the missing neck was pressed against, but not worked to good union with the body. The bore is filled with a broken-off roll of fiber obviously intended to strengthen the junction of head and body.

At the center of the top of the second plate-like torso (Fig. 25, *e*) there is a cylindrical cavity 4. mm. in diameter and 1. cm. deep, evidently provided to receive the wood or fiber tenon of a separately modeled head. That the extremity of the torso having this feature was the neck seems confirmed by a broad, shallow, symmetrically curved crotch cleft at the center of the abraded broader end.

Style V. Distinctive feature, legs represented. The single example of style V (Fig. 26, *i*, *i'*) is the only figurine in the series that was found in positive association with other objects. It was inside a cached parcel 17. cm. long and 7.5 cm. wide, the outer wrapping of which was thin strips of juniper bark laid lengthwise, doubled back at center over one end and turned down over the other. The wrapper was lashed in place lengthwise and crosswise by a thin strip of yucca leaf. Under the bark was a layer of very fine clean fiber, presumably yucca, which enclosed a roasted corn nubbin; two turns of a slender filament of yucca fiber tied into a loop on which was strung one truncated olivella bead; a piece of the shaft of a massive bone with much eroded surfaces; the forward half of an animal figurine of clay; and the human figurine, with an extremely keen bone point lying diagonally across the front of it with tip just below the mouth.

In this figurine (Fig. 26, *i*, *i'*) there is no demarcation between head and torso, these elements forming a continuous oval when viewed from the front. The pinched-up nose is relatively enormous and high placed, reaching slightly above the crown of the head. Beneath it are two deeply punctate nostrils and below them an oval mouth also deeply punched in, with a slight ridge suggesting the relief of lips surrounding it. There is a semblance of a transverse slit for the right eye, so vague that it is uncertain whether or not it is intentional. The pinched-on breasts are large, conical and in high relief, each with a punctation in the position of the nipple. At center, in the line of the lower margins of the breasts, is a circular pit .45 cm. in diameter, so regular that it seems to have been intentionally made, yet representative of no normal anatomical feature. Below the

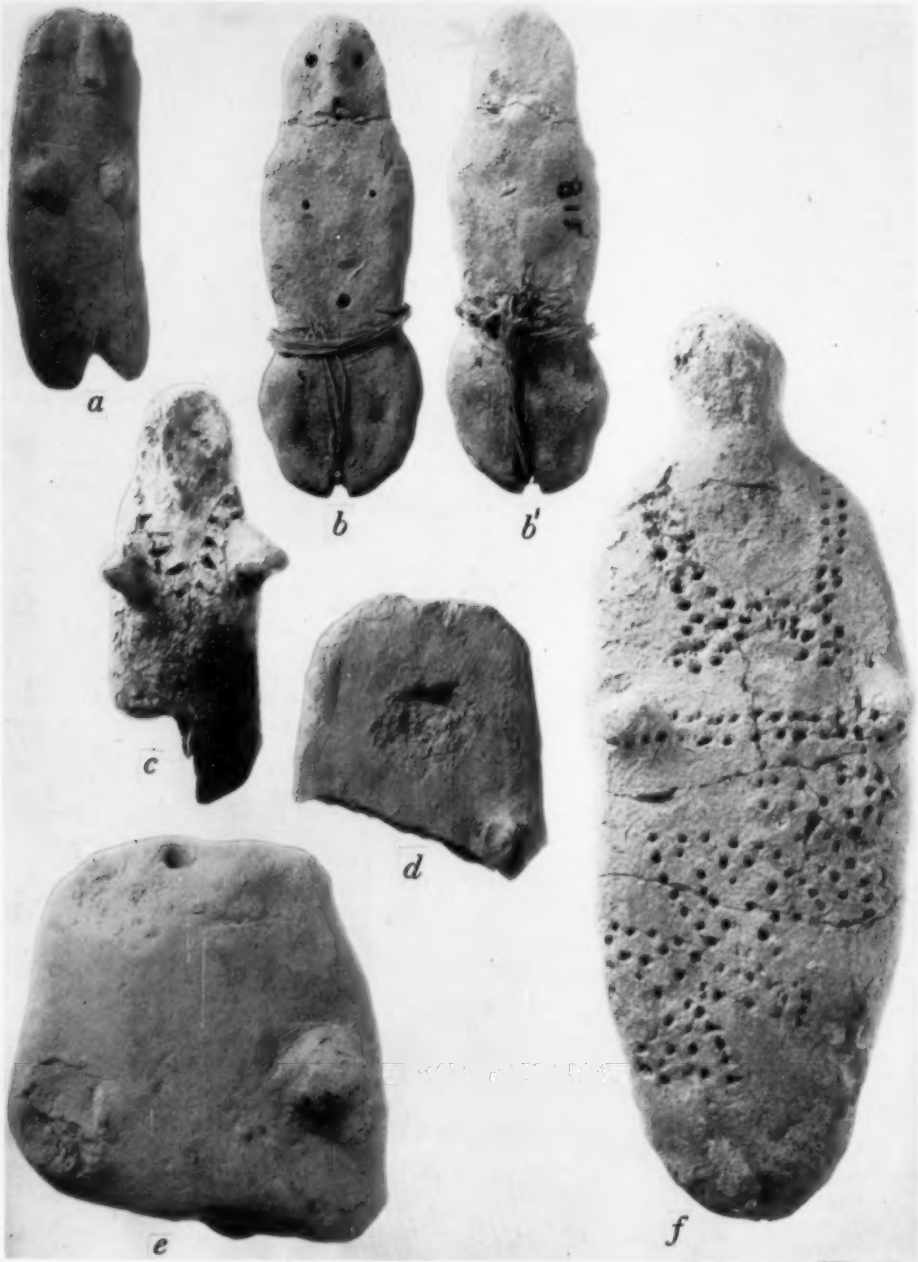

FIG. 25. Basketmaker III clay figurines. Style III, *a*; style IV, *b-f*. Natural size.

FIG. 26. Basketmaker III clay figurines. Style IV, *a*; *b-g*, incomplete; style V, *i*, *i'*. Natural size.

pit is a conical protuberance two-thirds the size of the breasts, presumably indicating the navel. The unique feature of this figure is that the legs were represented, not as mere stubs bordering the median cleft, but at full length. It is as if the figure were in kneeling posture and, as may best be seen in the side view, the left leg, though diminutive and foetus-like in proportion, is modeled in full detail. Slits in the tip of the stubby foot demark the five toes. Where the right leg has been broken away there is a large conical pit and at its tip the cast of a slender piece of wood, suggesting that the leg was modeled separately around a stick, the protruding end of which was then thrust into a prepared socket in the trunk.

A number of thorns, apparently cactus spines, were thrust deeply into the figurine. There is the stub of one in the position of the forward excretory vent and the mold of another at the anus. One juts downward from the right hip and one is present between the breasts. At each side of the head is one, its placement suggesting the position of the ear. One has been broken out of the middle of the back, another from just behind the left shoulder and two more from the right side. The piercing of the figure with spines and the finely worked tip of white bone, thin and rectangular in cross section, tapering with straight sides from a square butt .75 cm. wide to a needle-like point, which lay diagonally upon the trunk with tip just below the mouth, provide a

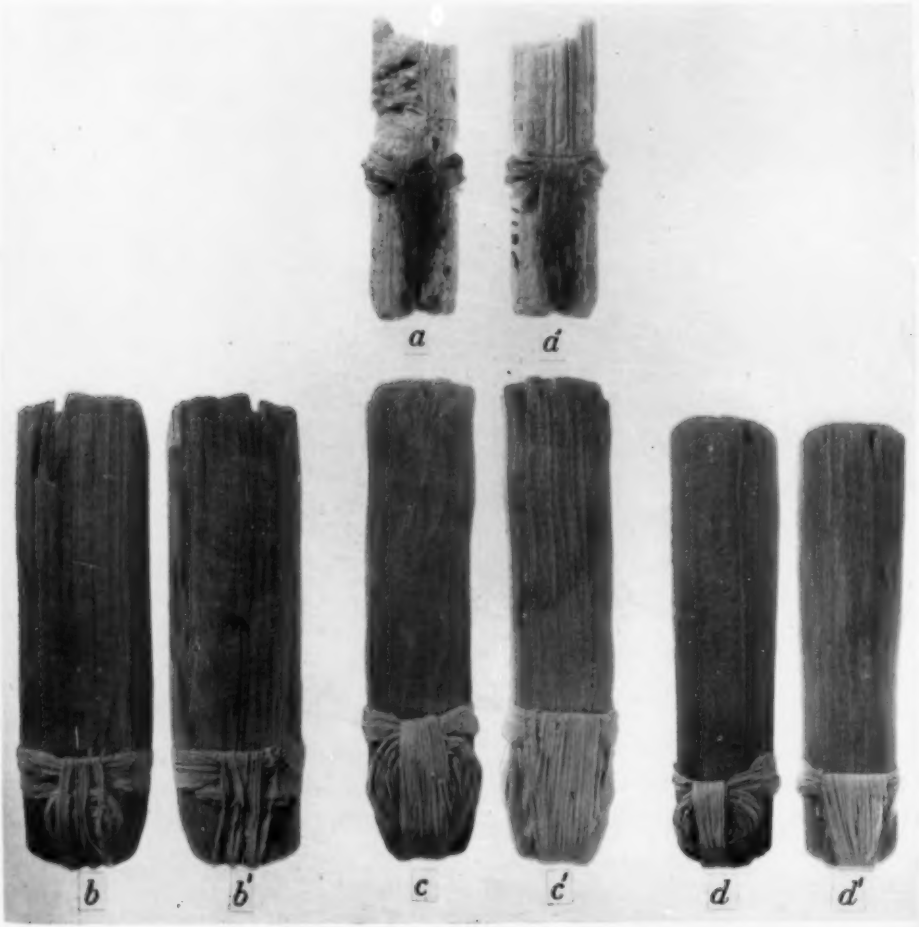

FIG. 27. Basketmaker III vegetal figurines. Corn pith, *a*, *a'*; Juniper wood, *b*-*d*. Natural size.

second instance of the possible practice of black magic during Basketmaker III.

Of seven incomplete figurines, details of which are clear (Fig. 26, *b-h*), all but *d* could have belonged in either style II or III. The exception, because of the crotch cleft, would have fallen in III or IV, depending upon the nature of the missing upper portion.

Considering the clay figurine group as a whole, of 20 specimens subject to determination, the nose ridge is present in all cases. Nostrils are represented in 3 positive instances and a possible fourth; eyes 6 times as slits and once as punctations; mouth 4 times as a slit, once as a slit with a pit at center. Of 21 torsos, breasts are present on 18. Among the 18, nipples are indicated 3 times by punctations. The navel appears but twice. Of 15 lower extremities, 12 bear the crotch cleft, either deep or shallow. Punctate treatment of the face area occurs in 3 of 19 cases. On 5 of 20 torsos there are necklaces represented by punctations and punctate patterns occur on 2 abdominal portions. There is but one instance of a pattern on the back of a figurine.

TABLE 2. SOURCE OF SPECIMENS

Figure	Number	Site
24, *a*	579	Room 9, Broken Flute cave
b	1026	Refuse, S. end Pocket cave
c	422	Room 8, Broken Flute cave
d	1246	Cave III
e	956	Room 2, Cave II
f	577	Room 9, Broken Flute cave
g	1122	Cave VIII
h	1118	Cave VIII
25, *a*	578	Room 9, Broken Flute cave
b	815	Obelisk cave
c	1415	Room 2, cave II
d	592	Refuse above room 9, Broken Flute cave
e	591	Refuse above room 9, Broken Flute cave
f	1423	Near Lukachukai store
26, *a*	1152	Cave VIII
b	231	Bin at W. side of room 7, Broken Flute cave
c	1362	Prayer Rock district, unknown
d	1076	Room 4, Pocket cave
e	1057	Room 3, Pocket cave
f	593	Refuse above room 9, Broken Flute cave
g	1427	Broken Flute cave
h	1361	Prayer Rock district, unknown
i	A.M.N.H. 29.1	
	8911	Obelisk cave
27, *a*	1126	Cave VIII
b–d	613, a, b, c	Southeast end, Broken Flute cave

With the exception of Figure 26, *e*, the objects in question are carelessly done, in the opinion of the writer bespeaking indifference rather than lack of ability on the part of the makers. Of the relief features, the noses sometimes were pinched up from the body mass, but more frequently were dabs of clay pressed on. The breasts seem invariably to have been added by the latter method. Punctation and incising are the only sorts of ornamentation.

In addition to the clay specimens there were three juniper wood figurines (Fig. 27, *b-d*) found together and for all practical purposes these are exact duplicates. They are thin split plates with the slivers rubbed off from the broken ends and the broader surfaces ever so slightly smoothed by transverse scouring. There would have been nothing to differentiate these objects from discarded chips, were it not for the presence at one end of each of a neat belt and apron of corn leaf or husk, with a carefully made spirally-wound menstrual pad in place beneath the apron.

There remains only 4.7 cm. of the torso of the slender corn pith figurines shown in Figure 27, *a*. The belt and the apron, which passes through a relatively deep crotch cleft, are of corn leaf or husk.

Clay figurines in the Prayer Rock series exhibit more character and diversity than those figured by Guernsey from the Segi (1939, Pl. 51; pp. 86-7), yet with most of them they share some diagnostic features—relatively enormous noses, conspicuous breasts, crotch clefts, or punctate decoration. Guernsey's series consists of but six members. Had it been larger, presumably it would have provided a closer parallel to the one here presented.

The five figured specimens from Canyon del Muerto (Morris, 1927, Figs. 8 and 9) fit perfectly into the Prayer Rock series. The incomplete specimen in 8, *c*, most probably would fall into style II, though conceivably it might belong in III; 8, *b*, and 9, *b* and *c*, are clearly of style IV, while 9, *a*, could well be a type specimen of style III. All this is as it should be, because the Basketmaker III culture of Canyon del Muerto and the Prayer Rock district was identical.

Figurines may be viewed as an integral element of Basketmaker III culture. They have been found wherever dry deposits of that age, essential to their preservation, have been examined; namely, in the Segi, Canyon del Muerto and the Prayer Rock district. The Basketmaker figurines differ rather widely from those recorded from neighboring areas. Those from the Texas caves seem to be characterized by swelled rounded nether extremities like the

pounding end of a pestle and often are painted (Coffin, 1932, Fig. 17, pp. 57-8). Hohokam figurines are vastly more elaborate and exhibit a much higher technique (Haury, 1937, Pls. CXCV-CCV, pp. 233-6). Figurines from the Fremont culture in Utah (Morss, 1931, Pls. 25-28, pp. 46-50) are in some respects like those of the Basketmakers in that they carry relatively huge pinched-up noses and heavy conical breasts. As a whole, however, the differences are greater than the similarities. Modeling of the Fremont specimens is much better done and more detailed. Moreover, the appliqued eyes, head ornaments and adornments of the lower ends, as well as the use of paint, are features which do not occur in Basketmaker specimens.

Regardless of local differences, the fact remains that figurines seem to be a consistent trait of relatively early culture stages over a vast and as yet unbounded domain in southwestern North America. Their great prevalence in the Archaic of Mexico; their manufacture by the cave dwellers of Texas, the Hohokam, the Basketmakers and the Fremont peoples of Utah might be taken to suggest that eventually they will be found to have a continuous distribution between their now known northern and southern limits. Presumably they exemplify a basic trait of an early agricultural complex, which was taken by various of the peoples to whom corn growing spread, and was carried on or developed by each in an individual way.

BIBLIOGRAPHY

COFFIN, EDWIN F.

1932. Archaeological Exploration of a Rock Shelter in Brewster County, Texas. *Indian Notes and Monographs*, No. 48. Museum of the American Indian. New York.

DOUGLASS, A. E.

1936. The Central Pueblo Chronology. *Tree Ring Bulletin*, Vol. 2, No. 4, p. 33. Tucson.

GUERNSEY, S. J.

1931. Explorations in Northeastern Arizona. *Papers of the Peabody Museum of American Archaeology and Ethnology*, Vol. 12, No. 1. Cambridge.

HAURY, EMIL W.

1937. Snaketown, Vol. 1. *Medallion Papers*, No. XXV. Globe.

1938. Southwestern Dated Ruins, II. *Tree Ring Bulletin*, Vol. 4, No. 3. Tucson.

MORRIS, EARL H.

1927. The Beginnings of Pottery Making in the San Juan Area. *Anthropological Papers of the American Museum of Natural History*, Vol. 28, Pt. 2. New York.

MORSS, NOEL

1931. The Ancient Culture of the Fremont River in Utah. *Papers of the Peabody Museum of American Archaeology and Ethnology*, Harvard University, Vol. 12, No. 3. Cambridge.

Carnegie Institution of Washington
Boulder, Colorado
September, 1950

SITES OF THE PALEO-INDIAN IN THE MIDDLE RIO GRANDE VALLEY

FRANK C. HIBBEN

THE PROBLEM of the antiquity of man in early America has rapidly divided itself into a series of detailed researches, each one dealing with special facets of the matter. To date the greatest progress in the relationship between the various cultures of the paleo-Indian has been made with geologic methods by which the rhythm of climatic changes of the late Pleistocene and recent times has been tied in with deposits involving human materials. The radiocarbon method has now appeared to bolster and refine the time scale. From all of these activities there is rapidly emerging a clearing picture of early times in the Americas.

Problems of early man in western North America have produced an apparent dichotomy, with the hunting cultures of the Sandia and Folsom variety on the one hand and the gathering cultures of the Cochise series (Antevs, 1937a; Antevs, 1937b; Sayles and Antevs, 1941) on the other. The exact position of the California manifestations (Campbell, William H. and Elizabeth W., 1935; Campbell, E. W. C., *et al*, 1937) which feature gathering tools as well as projectiles is not as yet clear. Throughout this dual picture of early man, there has been some tendency to regard the hunting horizons, with their distinguishable projectile points as criteria, as relegated to the Plains areas or the eastern portions of those regions affected by the paleo-Indian. The gathering cultures apparently occur to the west of the hunting areas; that is, from Arizona westward throughout the Basin and Range province.

In the years since the war, three major sites and a number of minor ones have come to light in the middle Rio Grande Valley which seem to extend the Cochise variation of the gathering culture farther east than heretofore demonstrated.

ALBUQUERQUE SITE

The first of these sites was encountered accidentally during the normal activities of the Albuquerque Sand and Gravel Products Company. The main gravel pit of this concern lies on the southern edge of Albuquerque, New Mexico, involving two river terraces in that area. The commercial workings at this spot have penetrated deeply through recent alluvia and into stratified gravels. Kirk Bryan worked in this area with a view toward more exactly dating the gravels with the various stages of the Wisconsin Recession. Unfortunately, Bryan's untimely death halted these unfinished researches. However, the work thus far accomplished, as well as the abundant faunal material, indicates that the gravels are Pleistocene and of considerable antiquity.

Some 22 feet below the original surface in this gravel pit, an occupation level was encountered as the power shovel removed sand and gravel during the commercial operations. The area was marked by scattered circular hearths in the form of lenses of charcoal. In general, the demarcation of the occupation level could be traced with accuracy by a thin line of humus, although gravel and waterlaid lenses of sand occurred both above and below the cultural stratum. Along this occupation line as well as embedded in the semi-consolidated gravels below, occurred a considerable number of faunal remains. Although identification of these remains is still in progress, those which can definitely be identified in the cultural stratum are here listed in order of importance of occurrence: Mammoth (*Elephas* sp.), bison (*Bison sp.*), horse (*Equus* sp.), camel (*Camelops* sp.), wolf (*Canis* or *Lupus*), large cat (*Felis* sp.), and ground squirrel (*Citellus* sp.).

Segments of mammoth tusks and whole teeth were common on and around the site area. Long bones and fragments of other mammals of typical late Pleistocene assemblage also occurred frequently. Most of the bones were surrounded or accompanied by yellow ocher, a circumstance which has been noted at other early man sites in the Rio Grande area. Some of the bone specimens were somewhat rolled as though water-washed.

At this same occupation level there were recovered 42 crudely chipped implements. Undoubtedly many more were not recovered as the nature of the commercial operations here precluded screening or careful excavation. The

employees of the Albuquerque Sand and Gravel Products Company were most cooperative in recovering bones and implements from this level. In many cases, however, it was impossible to state positively that the implements or the faunal material originated from the significant stratum. Enough implements, however, were found in place to justify the supposition that all similar tools came from the one area and at a single level.

The Albuquerque site is distinctive in that the tools are of rude outline and indeterminate usage as shown in the accompanying figures.[1] No projectile points of any description were recovered, and the chipping techniques exhibited in the artifacts seem to denote a rudimentary tradition of stone working. Some time ago Bryan (1938, 1939) pointed out that there were certain evidences in the Southwestern area which seemed to indicate the existence of cultures marked by rudely-chipped implements apparently without projectile points.

The material of the artifacts from the Albuquerque pit is a cherty slate. These pieces were originally pebbles which were roughly chipped on one or two sides to form a chopper or scraper. The instruments vary in outline and size with little classification possible.

Perhaps the most revealing item of the Albuquerque site was a single basin-shaped milling stone of sandstone which occurred on this same level (Fig. 30). This was recovered in place so its location could be verified. The occurrence of a milling stone of this form associated with mammoth and other fauna of late Pleistocene date does not appear startling in light of the Cochise finds from southern Arizona (Sayles and Antevs, 1941). Bryan was much impressed by a similar find of a milling stone from the Durst horizon near Abilene, Texas.

[1] Pen and ink illustrations were made by William R. Webb, IV.

FIG. 28. Gravel pit at Albuquerque. Students are working occupational stratum.

The entire area of the occupation site in the Albuquerque gravel pit was perhaps an acre. The operations of the Albuquerque Sand and Gravel Products Company have now gone beyond the limits of the charcoal and instrument-bearing stratum. There are, however, indications of other similar sites not only in this pit, but also in others in the Albuquerque area. In the gravel pit of the Springer Company to the north of Albuquerque, there have occurred fire hearths, the bones of mammoth, horse, and occasional rough implements whose provenience unfortunately could not be exactly determined.

COMANCHE SPRINGS SITE

Some 25 miles to the south of Albuquerque, in the vicinity of the small town of Tome, another place of importance in the survey of early man was discovered by John Fisher and Donald Narquis, students of the University of New Mexico. This site is known locally as Comanche Springs. At this spot, a considerable volume of water issues out of the piedmont of the Manzano Mountains not far from the mouth of Comanche Canyon. For a description of this area, see Denny (1941). In recent times there has been erosional cutting through the alluvia so as to reveal cross-sections of the deposits in a series of jagged arroyos. Near the confluence of two arroyos, just below Comanche Springs proper, a bone bed of limited extent has been exposed during this erosion.

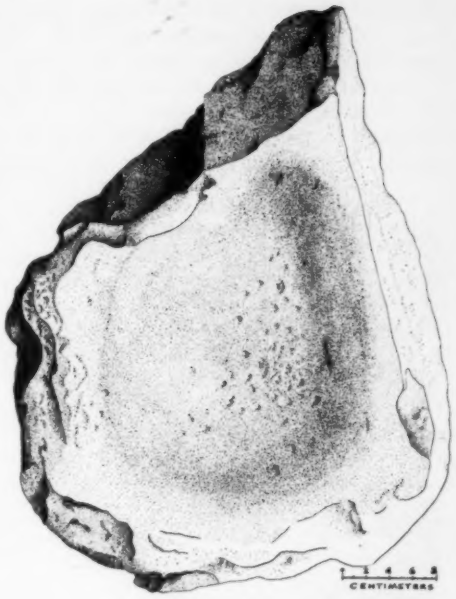

FIG. 30. Milling stone from Albuquerque site.

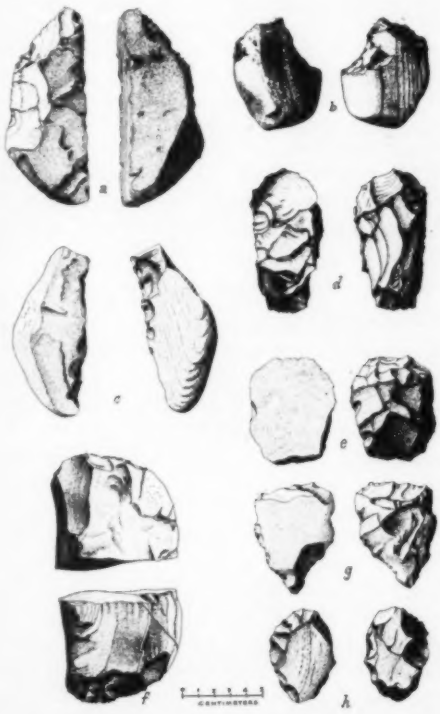

FIG. 29. Artifacts from Albuquerque site.

The Comanche Springs bone strata lie some 8 feet below the original surface of the ground, although the terrain is so eroded that the primary level is difficult to determine. The bones are embedded near the base of a blue clay stratum which is clearly demarked in a basin-like depression of some two acres extent. Bryan noted that the Comanche Springs site was similar to the stratification at Clovis, New Mexico (Antevs, 1935, 1950). Apparently the Comanche Springs area was a pond or basin possibly with the same general geologic history as the area of Blackwater Draw near Clovis.

Mixed with the bones at the bottom of the blue clay layer and scattered along the soil line which marked the edge of the original depression, some 22 rough implements have been recovered. These implements are all of quartzite of varying degrees of fineness and texture. The shapes and outlines display the same rude and casual manufacture as the tools from the Albuquerque gravel pit site. A number of the pieces from Comanche Springs may well be rejects or flakes incidental to manufacture. Some, which are illustrated, however, are indubitably scrapers or choppers of sorts (Fig. 31).

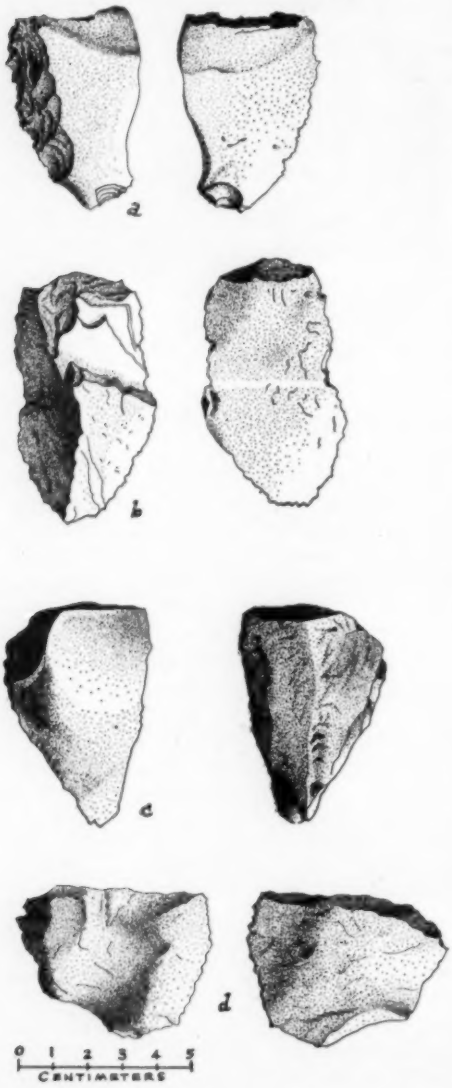

FIG. 31. Artifacts from Comanche Springs.

Several basin-shaped milling stones with shallow depression have also been found at the Comanche Springs site. None of these were found in place, although their disposition seemed to indicate that they had weathered out of the same stratum as the bone material in the normal course of erosion. There is considerable Pueblo and Apache material of more recent centuries in this same area and some artifacts of obviously late date are strewn on top of the most recent alluvial deposits.

Of the general dating of the artifact and bone-bearing level of the blue clay, however, there seems to be little doubt. All bone material identified is bison. Most of the bison bones are friable and only one horn core has been recovered to date. This one piece, however, is of the generally straight variety which is associated with *Bison antiquus* rather than with the more modern forms. It is interesting to note that the artifact inventory at Comanche Springs is essentially the same as that in the Albuquerque pit. No projectile points appear to be present. Only crudely-chipped implements occur at the site with the possibility of the presence also of basin-shaped milling stones.

RIO PUERCO SITES

A third site, or series of sites, of importance have been encountered in the very deep erosional cuts of the Rio Puerco de Este, 25 miles to the south and west of Albuquerque. The Rio Puerco is a tributary of the Rio Grande which flows almost parallel to the latter, then converges to enter the Rio Grande Valley near the small town of Bernardo. The Puerco Valley is, however, separated from the Rio Grande by only a low divide and is, in reality, a part of the main valley system. The recent history of the Rio Puerco has been one of erosional cutting of great magnitude. This process has revealed a number of deeply buried hearths and living areas which add materials to the sequence of early life in the Albuquerque area.

The Rio Puerco fire hearths occur in groups such as the one 5 miles down stream from the small railroad station of Suwanee. Here, approximately 10 circular areas of charcoal and ash have been cut through by the main Rio Puerco and by several side arroyos. The charcoal lenses are elliptical in cross-section and from 5 to 15 feet in diameter, roughly circular in outline. Between these areas, occupation levels and soil lines can easily be traced by scattered charcoal flecks and occasional implements. In general, the fire hearths stretch along a primitive terrace level which dips sharply toward the situation of the present Rio Puerco as though the occupation represented by these hearths of charcoal had been situated on a slanting river bank. The hearths now lie some 30 feet below the surface at their deepest portion to 12 feet in the other extreme. There is considerable indication that further studies may reveal a series of hearths at different levels, possibly indicating a somewhat extensive occupation in this area.

Any doubt as to the human authorship of these charcoal lenses is removed by the presence of milling stones and manos accompanying them. At the edge of one hearth 23 feet below the surface, occurred 2 basin-shaped milling stones lying together. In another charcoal area, 3 well-formed one-handed manos had been placed in a small pile. Another hearth produced a single mano of the same design. These basin milling stones and the one-handed manos which accompanied them are of the same general character as those from the Albuquerque gravel pit and the Comanche Springs area. Their similarity to Cochise material is also obvious. It is more difficult to determine the exact stage of the Cochise series where this similarity is greatest.

Rough stone implements from the Puerco sites are more scarce. Only 6 have been recovered in indubitable association with the charcoal fire lenses. These are, however, of the rough chopper-scraper type, similar in these respects at least, to the tools from the other middle Rio Grande situations. The materials from the Rio Puerco are chert and quartzite.

Bone remains are scarce to absent, in or around the Rio Puerco hearths. A few splinters of bone appear and a single bison tooth has been identified. Some faunal material has been recovered from comparable depths in the banks of the Rio Puerco but not close enough to the fire hearths to arouse more than casual interest.

Some pieces of charcoal in the hearth lenses are of sufficient size to identify varieties of wood involved. Those so far recognized include pine, box elder, walnut, and cottonwood or poplar.[2]

[2] These identifications made by Wood Products Laboratory, Washington, D.C.

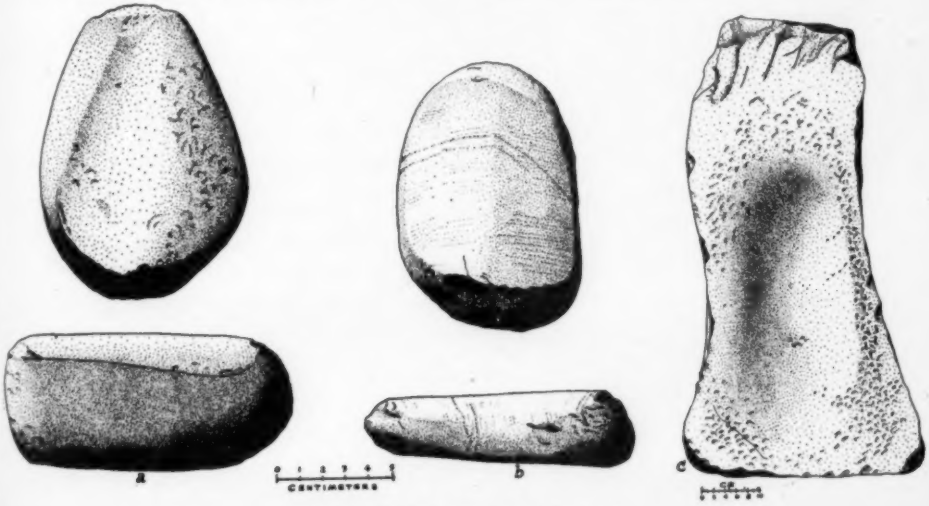

FIG. 32. Artifacts from Rio Puerco sites.

Bryan's (1936) excellent work on the headwaters of the Rio Puerco has unhappily not as yet been extended to cover the mid-portion of that drainage. Just before his death, he was working on the sediments involved in the Rio Puerco fire hearths. From these preliminary investigations, the human evidences here appear to be related to number 2 fill. This would indicate that the Puerco sites are considerably later than evidences at the Albuquerque gravel pit or Comanche Springs. Indeed, if Bryan's tentative identification of the fill is substantiated by further work, the Rio Puerco fire hearths are roughly contemporaneous with the middle levels of Bat Cave (Mangelsdorf, 1949). Although the primitive corn from Bat Cave was found in the lower portions of the upper level, it arouses the possibility that even agriculture, as evidenced by the finds in Bat Cave, may overlap with levels heretofore regarded as well before agricultural beginnings. Thus the users of the basin milling stones of the Rio Puerco may possibly have ground corn on these implements rather than wild seeds secured by gathering as previously supposed.

The artifact complex of the Puerco fire hearths is essentially the same as that in the other two areas of the middle Rio Grande Valley. The Puerco sites emphasize the basin-shaped grinding stone and the one-handed mano to the semi-exclusion of the roughly chipped tools, but the combination is the same.

There seems little doubt from all of this accumulated evidence that there existed in this part of the Southwest during the late glacial and early recent times a series of gathering cultures similar to those which have already been demonstrated for southern Arizona.

BIBLIOGRAPHY

Antevs, Ernst

1935. The Occurrence of Flints and Extinct Animals in the Pluvial Deposits near Clovis, New Mexico. *Proceedings of the Academy of Natural Science of Philadelphia*, Vol. 87, pp. 304-12. Philadelphia.

1937*a*. Climate and Early Man in North America. *Early Man*. J. B. Lippincott Co., Philadelphia.

1937*b*. Studies on the Climate in Relation to Early Man in the Southwest. *Carnegie Institution of Washington Year Book*, No. 36. Washington.

1950. Appendix. *Ancient Man in North America* by Wormington, H.M., The Denver Museum of Natural History Popular Science Series No. 4, Third Edition Revised. Denver.

Bryan, Kirk

1936. Successive Pediments and Terraces of the Upper Rio Puerco in New Mexico. *The Journal of Geology*, Vol. 44, No. 2, Part I, pp. 145-72. Chicago.

1938. Prehistoric Quarries and Implements of Pre-Amerindian Aspect in New Mexico. *Science*, Vol. 87, No. 2259, pp. 343-46. Washington.

1939. Stone Cultures Near Cerro Pedernal and Their Geological Antiquity. *Bulletin of Texas Archaeological and Paleontological Society*, Vol. 11. Abilene.

Campbell, E. W. C. et al.

1937. The Archaeology of Pleistocene Lake Mohave. *Southwest Museum Papers*, No. 11. Los Angeles.

Campbell, William H. and Elizabeth W.

1935. The Pinto Basin Site. *Southwest Museum Papers*, No. 9. Los Angeles.

Denny, C. S.

1941. Quaternary Geology of the San Acacia Area, New Mexico. *The Journal of Geology*, Vol. 49, No. 3, pp. 225-60. Chicago.

Mangelsdorf, Paul C. and C. Earle Smith, Jr.

1949. New Archaeological Evidence on Evolution in Maize. *Botanical Museum Leaflets*, Harvard University, Vol. 13, No. 6, pp. 213-7. Cambridge.

Sayles, E. B. and Ernst Antevs

1941. The Cochise Culture. *Gila Pueblo, Medallion Papers*, No. 29. Globe.

University of New Mexico
Albuquerque, New Mexico
February, 1951

HARRY P. MERA, 1875 - 1951

THE PASSING OF DR. HARRY P. MERA, on April 15th, brought to a close an outstanding career in the archaeology of the Southwest, extending well over a quarter century. His many activities in this field had made his name well known to scores of fellow workers. His prominence in the affairs of the Southwest Division of American Association for the Advancement of Science had brought him a wide acquaintance with a host of others engaged in varied branches of science.

Though Dr. Mera was closely identified with the Southwest, he had had an interesting and varied career in other parts of the United States before settling in Santa Fe. Born in 1875, the eldest son of a practising physician, he spent his early years in Detroit. Following graduation from high school he gained two years experience in the field of commercial art in New York, followed by a year in the mines of Leadville, Colorado, before deciding to follow in the footsteps of his father. Graduating from Ohio State University in 1899, he practised medicine in Detroit until 1905 when he found occasion to spend a few years in Santa Fe. There he developed a deep and abiding interest in the Southwest which was to bring him back on several occasions during his twenty years of practise in Abilene, Kansas.

On settling permanently in Santa Fe in 1922, he spent the following eight years as county health officer, an appointment that enabled him to make frequent visits to the neighboring pueblos and archaeological sites. He then began his archaeological survey and his sherd collections from dozens of previously unrecorded sites. At the same time, deploring the rapid disappearance of the native arts of the modern Pueblo Indians, he was one of a small group who banded together to interest others in the possibility of saving choice examples of this material for permanent exhibition in Santa Fe. This activity, with Dr. Mera serving for many years as chairman, soon led to a thriving organization incorporated in 1926 as the Indian Arts Fund, which was destined to pave the way for the entry of the Laboratory of Anthropology into the southwestern field.

In 1929 Dr. Mera began his full time activities with the newly organized Laboratory, as curator of archaeology. With his well developed sherd collection as a nucleus, and with the cooperation of several volunteer workers in the field he built up the Laboratory's extensive "sherd library" of samplings from over 2000 sites in the Southwest. In addition he continued his active part in acquiring material for the general collections of the Laboratory and the Indian Arts Fund, with special emphasis on the arts of the southwestern tribes. For several years he carried on exploration and excavations in various areas of New Mexico, thus providing important material for his department.

With all these resources at hand, he entered on his most prolific years of writing, as attested by his extensive bibliography. For his works he prepared his own maps and much of the illustrative material, including hundreds of his meticulous drawings of intricate designs. At the same time he participated in the numerous conferences of archaeologists and in the meetings of the Southwestern Division of the American Association for the Advancement of Science, in which

(Continued on page 48)

he served successively as chairman of Social Sciences, as executive committeeman, and finally as president of the Division.

In 1936 Dr. Mera suffered a severe coronary attack, the first of several which led finally to his retirement from the Laboratory in 1946. Yet in the intervening ten years, while his condition to some extent curtailed his field activities, he kept at his studies with remarkable perseverance and was busily engaged with his writing until recent months. He leaves a wife whose constant care prolonged his productive years, two sons and two daughters, and grandchildren who can look with pride on his life work.

KENNETH CHAPMAN
Santa Fe, New Mexico

BIBLIOGRAPHY

Laboratory of Anthropology. Technical Series Bulletins. Archaeological Survey.

1931. Chupadero Black on White. Bull. 1
1931a. Lincoln Black-on-Red. (with W. S. Stallings, Jr.) Bull. 2
1932. Wares Ancestral to Tewa Polychrome. Bull. 4
1933. A Proposed Revision of the Rio Glaze Sequence. Bull. 5
1934. A Survey of the Biscuit Ware Area in Northern New Mexico. Bull. 6
1934a. Observations on the Archaeology of the Petrified Forest National Monument. Bull. 7
1935. Ceramic Clues to the Prehistory of North Central New Mexico. Bull. 8

Laboratory of Anthropology. Memoir Series.

1937. The "Rain Bird," a Study in Pueblo Design. Vol. II

Laboratory of Anthropology. General Series Bulletins.

1938. The So-Called "Chief Blanket." Bull. 2
1938a. Navajo Blankets of the "Classic" Period. Bull. 3
1938b. The "Slave Blanket." Bull. 5
1938c. Pictorial Blankets. Bull. 6

Miscellaneous Publications.

1938d. Some Aspects of the Largo Cultural Phase, Northern New Mexico. American Antiquity, Vol. III, No. 3.
1938e. Reconnaissance and Excavation in Southeastern New Mexico. Memoirs of the American Anthropological Association, No. 51, 1938.

Laboratory of Anthropology. Memoir Series.

1939. Style Trends of Pueblo Pottery in the Rio Grande and Little Colorado Cultural Areas from the Sixteenth to the Nineteenth Century. Vol. III

Laboratory of Anthropology. General Series Bulletins.

1939a. Banded-Background Blankets. Bull. 7
1939b. Wedge-Weave Blankets. Bull. 9

Laboratory of Anthropology. Technical Series Bulletins. Archaeological Survey.

1940. Population Changes in the Rio Grande Glaze-Paint Area. Bull. 9

Laboratory of Anthropology. General Series Bulletins.

1940a. Navajo Rugs of the Crystal and Two Gray Hills Type. Bull. 10
1940b. The Serrate Designs of Navajo Blankets. Bull. 11
1940c. The Zoning Treatment in Navajo Blanket Design. Bull. 12

Miscellaneous Publications.

1940d. Some Aspects of the Jumano Problem. (With France V. Scholes). Carnegie Institution of Washington. Contributions to American Anthropology and History, No. 34.

Laboratory of Anthropology. General Series Bulletins.

1942. The Chinlee Rug. Bull. 13

Laboratory of Anthropology. Technical Series Bulletins. Archaeological Survey.

1943. An outline of Ceramic Developments in Southern and Southeastern New Mexico. Bull. 11

Laboratory of Anthropology. Memoir Series.

1943a. Pueblo Indian Embroidery. Vol. IV

Laboratory of Anthropology. General Series Bulletins.

1943b. Navajo Twilled Weaving. Bull. 14
1944. Navajo Woven Dresses. Bull. 15
1944a. Indian Silverwork of the Southwest: Bridles. Bull. 17

Miscellaneous Publications.

1944b. Jaritas Rock Shelter, Northeastern New Mexico. American Antiquity, Vol. IX, No. 3.

Laboratory of Anthropology. General Series Bulletins.

1945. Cloth-Strip Blankets of the Navajo. Bull. 16
1945a. Indian Silverwork of the Southwest, Band Bracelets: Filed and Stamped. Bull. 18
1945b. Indian Silverwork of the Southwest, Band Bracelets: Embossed. Bull. 19

Miscellaneous Publications.

1945c. Negative Painting on Southwest Pottery. Southwestern Journal of Anthropology. Vol. I, No. 1

Laboratory of Anthropology.

1947. Navajo Textile Arts.

Miscellaneous Publications.

1949. The Alfred I. Barton Collection of Southwestern Textiles. San Vicente Foundation, Santa Fe, N. M.

FLOYD SCHULTZ, 1881 - 1951

FLOYD SCHULTZ died at Clay Center, Kansas, April 8, 1951. He was one of those rare amateur archaeologists who, without direct professional guidance, became aware of the necessity for the documentation of archaeological collections and of the close relationship between ethnology and archaeology. Born at Fort McKavett, Texas, November 21, 1881, and spending most of his youth in and about Fort Riley, Kansas, as the son of a member of the U. S. Army, he became steeped in the history and ethnography of the Great Plains through associating with men who knew the Indian as both a friend and as an enemy.

In his spare time during his varied career as machinist, businessman, and civic leader, and later in his retirement, he devoted himself to a study of the history and anthropology of the Plains. In the past twenty-five years he made an archaeological survey of the Republican River Valley in Kansas, locating innumerable sites and carrying on excavations at more than fifty of them. He was familiar with the characteristics of Upper Republican earth lodges before any had been dug by professional archaeologists. Notes were taken, maps were drawn. The specimens were carefully restored and catalogued according to location within excavations at each site.

He was senior author with Albert Spaulding of a paper entitled, "A Hopewellian Burial Site in the Lower Republican Valley, Kansas," published in 1948 (AMERICAN ANTIQUITY, Volume 13, Number 4, pages 306-313). That same year he gave his entire archaeological collection of over 3000 catalogue entries, complete with notes and maps, to the Museum of Natural History at the University of Kansas. As a result of his careful work it will be possible for the archaeology of the lower valley of the Republican River to be written with a minimum of additional field work.

Mr. Schultz also made an ethnographic study of the Pottawotomie and other tribes living in and near Mayetta, Kansas, collecting items of material culture, taking notes on various phases of their culture, and making motion pictures of their economic activities and the building of the last bark lodge.

Floyd Schultz was a sincere and likeable person whom I treasured as a friend and as an archaeological colleague. His collection remains as concrete evidence of what a self-trained man can contribute to archaeology through a painstaking study of a limited area.

— CARLYLE S. SMITH

FACTS AND COMMENTS

IRRIGATION IN EAST CENTRAL CALIFORNIA

There is considerable divergence of opinion among authorities regarding the distribution of the practice of irrigation by the prehistoric Indians of the Southwest. Martin, Quimby, and Collier (1947, p. 168) write that the irrigation of the Hohokam of central and southern Arizona is the only known instance of canal irrigation in pre-Columbian North America. Thomas (1948, p. 10), however, writes that canal system irrigation was not limited to the area of the Hohokam but that "in many ravines and valleys in Arizona, New Mexico, Colorado, Utah and Southern California are found the remains of canal systems which tapped the natural streams and carried water to the numerous small farms." Wittfogel (Wittfogel and Goldfrank, 1943), has assembled published evidences of irrigation in the Anasazi area, north of the Hohokam, such as its practice west of the Wasatch Mountains in the Great Basin portion of Utah, described by Steward.

In a desert region of California well to the north of the Southern California to which Thomas referred, lies the Owens Valley, a narrow trough between the Sierra Nevada on the west and the Inyo and White mountains on the east. This valley was and still is peopled by a band of Northern Paiutes who are usually designated by the name of the valley in which they are concentrated as the Owens Valley Paiutes. Steward (1929) called attention to the Owens Valley Paiutes' utilization of irrigation at several of their villages along the length of the Owens Valley. He believed that all of the Paiutes' systems were contained in the Owens Valley and were restricted to simple canals which diverted part of the water from natural channels (streams issuing from the eastern flanks of the Sierra Nevada). The water was led to sloughs where the water was allowed to flood out over tubers and bushes producing edible seeds. These plants grew there naturally and were never planted or cultivated by the Paiutes. Steward describes as typical the irrigation of two natural plots, one containing spike rush having edible bulbs, and the other, *Brodiaea capitata*, or grassnuts. Bishop creek was dammed and a ditch ran to each of the plots. The system was still in operation at the time of the white men's penetration into the valley. One irrigator was elected each spring who watered a plot by small ditches and dams of mud, sod, and brush. His only tool was a pole four inches in diameter and eight feet long. The plots were alternated annually, probably to provide for natural seeding (Steward, 1933, p. 247).

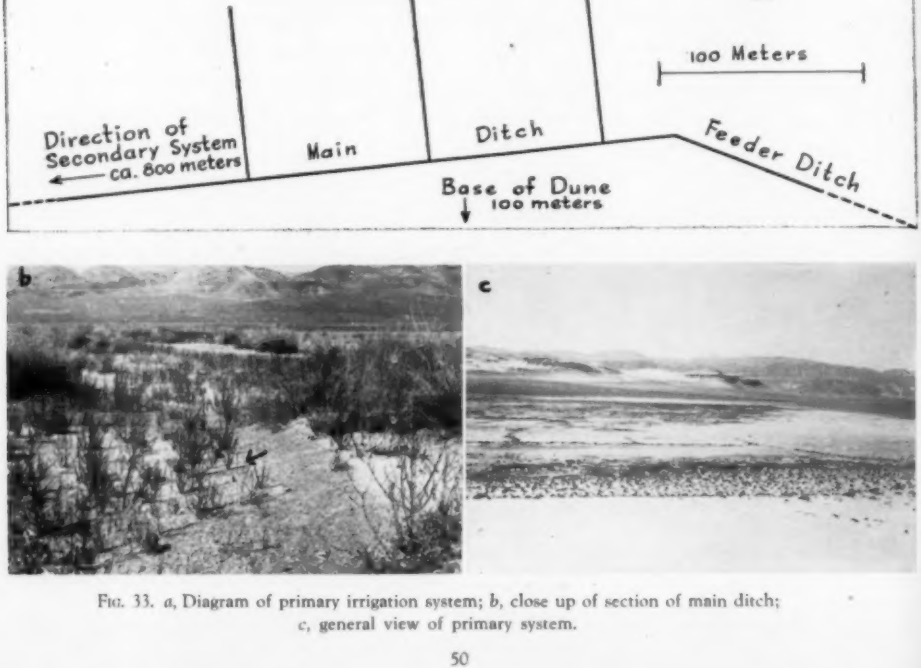

FIG. 33. *a*, Diagram of primary irrigation system; *b*, close up of section of main ditch; *c*, general view of primary system.

In this paper the author would like to add to Steward's findings by describing some complex systems recently discovered in an isolated desert valley within the territory ranged by the Owens Valley Paiutes, and thereby demonstrate that canal system irrigation was not restricted to Arizona in pre-Columbian times, nor for that matter was it restricted to Arizona, New Mexico, Colorado, Utah, and Southern California.

Eureka Valley is a small, oblong stretch of desert east of the Owens Valley, north of Death Valley, encircled by the Inyo and Last Chance mountains, and nearly touching, at its northeastern extremity, the California-Nevada border. It is noted by the few inhabitants of the surrounding country only as being utterly devoid of water or of vegetation except for scattered creosote bushes, and for containing at its western end one of the largest single sand dunes in the United States.

The irrigation systems of Eureka Valley came to the attention of the author when he visited the valley to examine the sand dune. The dune was reached after leaving the paved road several score of miles behind and abandoning roads of any description for ten or fifteen miles. The dune has an impressive bulk and stands 650 feet above the valley floor. From its top was discerned a peculiarly straight line running east and west near the foot of the dune and perpendicular to this line, three other lines running north, away from the base of the dune. Examination of the main straight line, which would not be noticed from the ground, proved to be the main ditch of an irrigation system and the three perpendicular lines issuing from it were lateral irrigation ditches each capable of flooding a 10,000-square-yard plot (Fig. 33, *a, c*). About 375 yards of the main ditch are still recognizable but both ends fade out under the encroaching fans of the sand dune. The eastern end is the higher and evidently carried the water to the system, while the western end runs in the direction of a second and similar system a half-mile to the west until it becomes indistinct. This second system is located in the lowest spot in the valley. In spite of the enormous quantity of air-borne sand in the vicinity on windy days the ditches are still six inches below the otherwise level desert and are further marked by a darker soil and by heavy growths of tumbleweed and sage not to be seen in the surrounding desert.

The situation of these ancient irrigation systems in an apparently waterless valley became less amazing to the author when, after repeated visits to the vicinity, he invariably found part of the east side of the dune damp to a height of approximately 100 feet. This was especially significant in seasons when it was known that no precipitation had fallen in the valley for months. This would appear to add credibility to the offer an old Indian made to ranchers of Fish Lake Valley (north of Eureka Valley) to locate, for a price, a spring for them under the dune. He unfortunately died before advantage could be taken of his offer.

The feeder canal disappears under the fans of the dune running in the direction of the damp sand. The dune and the primary irrigation system lie in the southeast corner of the valley. The dune is adjacent to a fault scarp of the Last Chance Range, near the lowest part of the valley, a position admirably suited for the emergence of springs. It is, in fact, at a corresponding point in Deep Springs Valley—a similarly oriented valley immediately to the west with a comparable slope and scarp—from which a number of springs issue, supplying enough water to irrigate over a hundred acres and to feed a sizeable lake.

Another evidence of the spring is the great quantity of sherds, and a profusion of obsidian chips in the vicinity of the primary irrigation system. The chips indicate that the obsidian was worked on the spot and, as the nearest source of this volcanic glass is many miles from the locale, it is probable that the Paiutes camped and lived on this spot for a considerable period of time. This of course would be impossible without a constant flow of water near at hand.

The problem of tracing the possible diffusion of irrigation from the peripheral areas in which the Anasazi practiced it, to the Eureka and Owens valleys, is an intricate one. If indeed the diffusion of irrigation did take place it must have been along the following lines. Martin, Quimby, and Collier (1947, p. 227) describe the arrival of Modified Basketmaker and Pueblo I characteristics in southeastern Nevada. These early traits were agriculture, baskets, pit-houses, and pottery which the authors infer reached Nevada about 800 A.D. and persisted until 1200 or 1300 A.D. The site that has told us the most about this period is Lovelock Cave which contains stratified cultural deposits covering more than 1,000 years (Loud and Harrington, 1929). The earliest period discerned by Harrington is sufficiently similar to Southwestern Basketmaker to leave no doubt of historical connection and approximate contemporaneity. Transitional Lovelock seems to correspond with Developmental Pueblo, also called Pueblo II. And according to Steward (1940, p. 465), "The Lovelock late period, whether representing the culture of the Pit River Indians, as some have supposed, or of the Northern Paiute, is not radically different either from the culture of the latter or of the transitional period." Steward further points out that besides the Basketmaker and Pueblo traits which Martin, Quimby, and Collier believe were introduced from the Anasazi area to southeastern Nevada, irrigation may have been introduced and transmitted to the present day Shoshoni. He writes that in isolated instances "small gardens cultivated by both [Shoshoni] men and women, were made wherever there was water. Moist ground was preferred; otherwise land was irrigated" (Steward, 1941, p. 232). The geographical and cultural affinity of the Shoshoni and the Northern Paiute would indicate that both either derived irrigation from these older Puebloid cultures, or perhaps they independently originated irrigation.

If the Northern Paiute independently originated irrigation, the peculiar form it took in the Owens Valley with its simple ditches running to natural bogs provides

an interesting transition phase between the accidental irrigation of a stream flooding over its banks in the spring, and the complex systems of Eureka Valley with their spring-fed main ditches and laterals flooding precisely laid-out plots which conformed strictly to the contours of the valley floor.

The discovery of the Eureka Valley irrigation systems does not necessarily affect Steward's thesis that the Paiutes developed or acquired irrigation without the practice of horticulture. In the light of their construction of such a fully planned and well executed means of distributing the water it only becomes more puzzling that they did not develop or adopt the artificial planting and cultivation of the plants which they harvested.

BIBLIOGRAPHY

Loud, L. L., and M. R. Harrington

1929. Lovelock Cave. *University of California Publications in American Archaeology and Ethnology*, Vol. 25, pp. 1-183. Berkeley.

Martin, Paul S., George I. Quimby, and Donald Collier

1947. *Indians before Columbus*. University of Chicago Press.

Steward, Julian H.

1929. Irrigation without Agriculture. *Papers of the Michigan Academy of Science, Arts, and Letters*, Vol. 12, pp. 149-56. Ann Arbor.

1933. Ethnography of the Owens Valley Paiute. *University of California Publications in American Archaeology and Ethnology*, Vol. 33, pp. 233-350. Berkeley.

1940. Native Cultures of the Intermontane (Great Basin) Area. *Smithsonian Miscellaneous Collections*, Vol. 100, pp. 445-502. Washington.

1941. Culture Element Distributions XIII, Nevada Shoshone. *Anthropological Records*, Vol. 4, No. 2, University of California Press, p. 232. Berkeley.

Thomas, George

1948. *Early Irrigation in the Western States*, University of Utah Press, p. 10. Salt Lake City.

Wittfogel, Karl A., and Esther S. Goldfrank

1943. Some Aspects of Pueblo Mythology and Society. *Journal of American Folklore*, Vol. 56, pp. 17-30. Menasha.

Richard W. Patch
Cornell University
Ithaca, New York
November, 1950

ARCHAEOLOGY IN THE BROOKS RANGE OF ALASKA

A cursory survey of the archaeology of parts of the Endicott mountains was made by the writer during 1950. It served to confirm a belief that the mountain region is and in the past has been hospitable to small groups of people dependent on hunting and fishing. Ten sites near the Anaktuvuk and Killik rivers were examined, and the probable locations of several others were obtained from local Eskimos. Recognizable culture phases encountered include types comparable with the modern and recent-prehistoric Eskimo, and Denbigh Flint complex, as described by Giddings (J. L. Giddings, "Early Flint Horizons on the North Bering Sea Coast," *Journal of the Washington Academy of Sciences*, Vol. 39, No. 3, March 15, 1949, pp. 85-90). In addition, a number of flint implements which are not readily identifiable were found in the sand dunes along the Killik River (Fig. 34). No evidence of ground slate or jade was found anywhere, and implements of organic materials were preserved only in the most recent sites.

The Denbigh Flint complex material occurred on top of a knoll overlooking the Anaktuvuk River, about twenty miles from its source. The first indications of a site were some pieces of flint in small hollows excavated in the sandy soil by the wind. About 65 artifacts of flint were recovered from the surface, where they lay exposed alongside animal bones and cooking rocks. A small test pit yielded two fragmentary side blades and a polyhedral core, which came from a series of charcoal lenses believed to comprise a single hearth. The hearth apparently had not been disturbed. It contained a quantity of animal bones and cooking rocks such as those found on the surface, but no bone implements. No evidence of the type of habitation was found, but it is possible that tents were used. Implements from other cultures seemed to be completely lacking.

Small lamellar flakes, such as occur in Denbigh material, were found in two other sites as well. One of these also produced very large, roughly made, bifacially chipped side-scrapers, similar to the one illustrated but 12 or 13 centimeters long.

Plans are being made to continue work in this area during 1951.

William Irving
University of Alaska
College, Alaska
January, 1951

NOTES ON AN ALEUTIAN CORE AND BLADE INDUSTRY

The possibility of a culture preceding that of the earliest paleo-Aleuts in the Aleutian Islands has been recognized for a long time. However, the researches of Jochelson and Hrdlicka provided no substantiation for such a possibility. Subsequent excavations carried out by the Peabody Museum of Harvard University in 1948, a party sponsored by the Arctic Institute of North America in 1949, and a party from the University of Oregon in 1950 have similarly failed to reveal any culture earlier than that of the paleo-Aleuts. Re-examination of an existing collection suggests the presence of such a culture in the Aleutian Islands.

In the summer of 1938, while a member of the Smithsonian Field Expedition to the Aleutian and Commander Islands under the direction of Hrdlicka, I had the opportunity of collecting a number of artifacts, illustrated in Figure 35.* These were collected from the surface of a site on the top of the south end of Ananiuliak

* Photograph by R. G. H. Robinson.

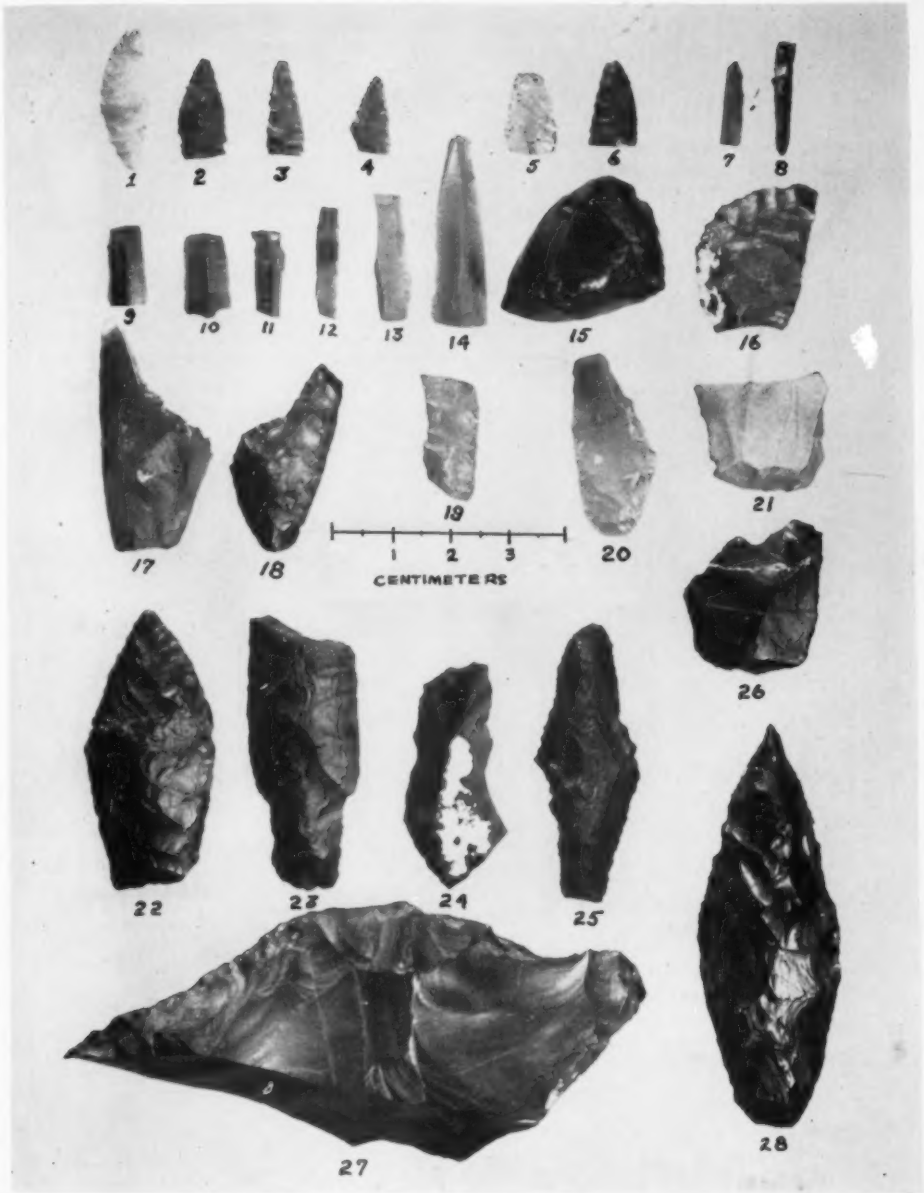

FIG. 34. Denbigh Flint Complex implements from the Anaktuvuk Valley. *1-4*, side blades (only 1 is complete); *5, 6*, side blades from test pit; *7, 8*, burin spalls; *9-14*, lamellar flakes; *15*, prepared core from test pit; *16*, knife blade; *17-20*, angle burins; *21, 26*, end scrapers; *24*, flake side scraper; *25*, flake knife. Artifacts from the Killik River sand dunes. *22, 23, 28*, points (*23* is fragmentary); *27*, bifacially chipped side scraper.

Island, a small island lying 5 miles northward of Nikolski Village near the southwest end of Umnak Island. In the course of hunting over the top of the island I noticed an exposed area in which a few hundred artifacts lay on the surface. An intensive search of this exposure which was actually a series of blowouts, revealed blades, cores, scrapers, and one bifacially chipped knife, to the exclusion of any points or the common forms of Aleut knives. This collection was turned over to Hrdlicka; those illustrated here represent duplicates.

Most significant in the location of this site is the fact that it is on top of the island, in distinction to the usual Aleut village sites which are generally located at the edges of the islands, close to the sea and near fresh water streams. There is such a village site less than half a mile distant which was occupied by Aleuts within historic times. The latter site is typical in that it consists of midden material and is recognizable from a distance by the lush vegetation growing on it.

These artifacts are distinguished by the fact that they include a core, blades or flake knives, and scrapers. According to Giddings, who has examined these specimens, the core (5), is very similar to those from the Denbigh Flint complex. The end scraper (*1*), is also represented in the same complex and is a distinctive form. The other scrapers (*2* and *3*), and the knife (*4*), are too generalized to compare with any particular industry, though the knife may be considered similar to some from the Aleutian village sites. The two flake knives (*7* and *9*), might be present in the Denbigh Flint complex but they are also present in the paleo-Eskimo cultures of Cape Denbigh and Point Hope. The flake knives (*6* and *8*), appear to have been made from large

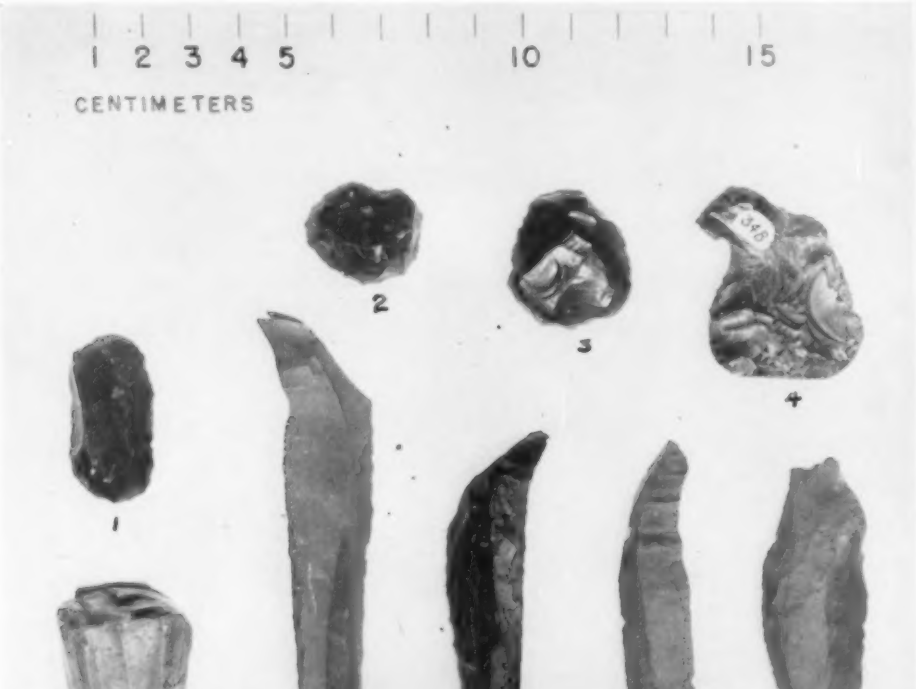

FIG. 35.

prepared cores of Mesolithic type, and are similar to those found by Solecki in the northern foothills of the Brooks Range.

An examination of our collections from the Nikolski village site, both paleo-Aleut and Aleut, reveals no comparable artifacts except for the scrapers and possibly the bifacially chipped knife. This knife is unusual in being made of obsidian, though a few obsidian knives do occur. An examination of the materials also reveals an interesting contrast. Preliminary identifications by J. E. Gair, of the Department of Geography and Geology, indicate that the core is chalcedony; flake knives 6 and 8 are made of argillite; flake knife 9 is made of chert; and flake knife 7 is made of a melaphyre. The scrapers are made of obsidian. The vast majority of chipped artifacts in the Aleutian village sites are made of andesites or basalts, with regional variations.

It should be noted that this small collection, or all the artifacts collected here, may not represent a true sample of this site. If points and the typical paleo-Aleut and Aleut knives should subsequently be found here, this relatively large number of blades and cores would remain as a distinctive characteristic of this site. Further, though there was no evidence of a midden, characteristic of village sites in this area, no excavation was made. If this is essentially a Mesolithic industry preceding that of the paleo-Aleuts, it would probably be over 5,000 years in age. This estimate is based on the radiocarbon tests of one of the lower paleo-Aleut levels above the floor of the Nikolski village site, which gave an age of 3,000 years. The possibility that this site was employed as a manufacturing station contemporaneously with the nearby village must also be considered. It is clearly not a village site. The artifacts described here may be considered distinctive from the paleo-Aleut and Aleut artifacts in the kinds of materials used, and in the use of blades and cores.

W. S. Laughlin
Department of Anthropology
University of Oregon
Eugene, Oregon
January, 1951

NOTES ON TWO ARCHAEOLOGICAL DISCOVERIES IN NORTHERN ALASKA, 1950

Several significant pre-Eskimo finds related to early aboriginal occupations in North America were made north of the Arctic Circle during the 1950 season in Alaska. These discoveries were made within and just bordering the northern side of the Brooks Range mountain province. Two of the more important finds were made by Milton C. Lachenbruch and Robert J. Hackman of the U.S. Geological Survey. Another important find was made by Irving, a student at the University of Alaska (Giddings, 1950, p. 20). Lachenbruch's and Hackman's specimens were submitted to the writer for study and are described summarily in this paper. It is reported that Irving found lithic cultural remains similar to those found by Hackman not far from the latter's station near Anaktuvuk Pass.

The artifacts recovered are of especial interest because they are pertinent as links in the growing chain of evidence of early man in Alaska. The collection contains fluted projectile points, prepared polyhedral cores, and artifacts of the Denbigh Flint complex. The latter has been described by Giddings (1949, 1950) who discovered this early lithic manifestation in a deep stratified site in the north Bering Sea area.

The area of Lachenbruch's finds is in a remote mountain pass route through the De Long mountains in the Brooks Range. It is on the Kugururok River, one of the upper branches of the Noatak River. The headwaters of the Kugururok River are but a scant five miles from the headwaters of the Utukok River, upon which the Folsom point described by Thompson (1948) was found. The connecting pass between these two respectively southward and northward flowing drainages is at an elevation of about 3,000 feet and is bounded by towering mountain slopes 1,000 to 2,000 feet higher. Situated on prominent knolls within the glacial debris-strewn valley, Lachenbruch discovered four sites yielding several hundred flint chippings and a few artifacts. These were all surface finds. From their strategic location on game trails, these sites were evidently look-out stations where hunters renewed their supply of flints while keeping vigil. Athough direct evidence is wanting, we may presume that the game hunted primarily would be migratory animals, such as the caribou, which abound in great numbers in the vicinity today.

On one of the hilltop sites were recovered two fluted projectile points (Fig. 36, *c*, *d*), one polyhedral-shaped fluted core (*a*). These objects are among the more diagnostic artifacts recognized. Another site yielded a single polyhedral core which shows an attempt to remove an imperfection (Fig. 36, *b*, see arrow).

The larger of the two fluted points is recognized by Roberts as being typologically admissible as a Folsom point. This point (Fig. 36, *c*), damaged at the tip, originally measured about 4.2 cm. long. It is 2.1 cm. wide at the maximum width. One side has a single channel. The opposite side is double channeled. These channels measure 2.5 cm. long and 0.8 cm. wide. Inspection shows that they were struck from the base. Secondary chipping at the base produced the concavity. Further inspection shows that parallel flakes had been removed at right angles to the axis of the flint before the channels had been struck off. The flakes, which cannot be called true "ripple flakes," extended to about the middle of the face. When viewed in longitudinal cross-section, the mid-section (0.6 cm.) is thicker than the rest of the specimen which is tapered toward the ends. Viewed in profile, the maximum width is forward of center. The opposing basal sides have been rubbed. The concave base also had been dulled. This specimen is made of black chert, a stone which appears to be of local origin.

The second fluted point (Fig. 36, *d*), more like the Plainview type as described by Krieger (1947, pp. 939-44), is also broken at the tip. Measuring 2.6 cm. long, its original length may have been about 4 cm. The base is 2.3 cm. wide. One face bears three channels, while the other side has two. These channels, situated side by side, were struck from the base. The longest channels measure 1.8 cm. long and 0.8 cm. wide; and 1.4 cm. long and 0.8 cm. wide on both respective faces. The base is shallowly concave. The latter and the opposing basal sides have been rubbed. This artifact was made of locally derived light green chert. It is slightly translucent at the edges.

The associations of the prepared polyhedral core with these fluted points is not clear, since all were surface collected. No fluted projectile points have ever been found associated with polyhedral cores farther south on the continent. It is possible that the prepared flint cores may be a later cultural trait. Indeed certain of the objects such as knives and blanks found on the Kugururok River sites cannot be distinguished from the prehistoric Eskimo flints found by the writer on the north slope (Solecki, 1950). It is very likely that these sites had been occupied on successive occasions, since their importance as hunting stations must have been realized by every hunter in the region.

One of the most pertinent deductions we can make is that these fluted points and the rest of the lithic material are of post-glacial antiquity. Unfortunately, glacial studies and accompanying stratigraphical studies of recent deposits have not been made in the mountain province as of this writing. We do know that the alpine-type glacier prevailed in the Brooks Range and the latter was not blanketed by a massive glacier like that covering Greenland. No materials susceptible to Carbon 14 analysis were recovered. The date of the occupation would certainly seem to be well within the time span following the glacial recession in the mountain valleys. However, until definite data which can be used for reliable dating are obtained in the north, we cannot make any conclusive statements.

Some 245 miles to the east and 7½ miles north of the mouth of Anaktuvuk Pass, a good route through the Brooks Range, Robert Hackman discovered a site yielding artifacts typologically related to the Denbigh Flint complex (Solecki and Hackman, 1951). This site was situated on the shore of a small mountain-fed lake, Lake Natvakruak, which empties into the Sik-Sik-Puk River, eventually flowing into the Colville River and the Arctic Ocean. This station seems to have been a lake-side habitation site instead of being a mere hunting or chipping station. Prehistoric and historic Eskimo objects were found in the same area in addition to the artifacts of the Denbigh Flint complex. Fire hearths and rings of stone were associated with the chipped artifacts. The shore line of the lake seemed to have changed little from the time of the earliest occupation, that of the Denbigh Flint complex peoples. The northern side of the lake is dammed by a glacial moraine which fixes the site as of post-glacial origin. Of the less than 100 odd specimens recovered by Hackman, and several by George Gryc (also of the Geological Survey), the majority were found at the base of tundra clumps at a depth of about 10 inches. This is contrasted with the prehistoric and historic artifacts which were picked up on the surface where the soil cover was sparse. Soil erosion at this site, as elsewhere in the Arctic, is a slow natural phenomenon resulting in little or no overburden.

The artifacts were made of locally derived chert except for 11 lamellar flakes of obsidian. The chipping technique is definitely finer than the more frequently encountered artifacts of the chronologically later Colville Basin phase, or prehistoric Eskimo on the north slope. Represented on this site are burins, end scrapers, a polyhedral core, lamellar flakes, and end and side blades. Illustrating these finds are the one semi-polyhedral fluted core from which lamellar flakes were detached on the forward end (see arrow, Fig. 36, *e*); lamellar flakes (*f, g, h*); two stemmed artifacts which have been rubbed on the sides of the broader end (*i j*); burins (*k, l*); finely flaked side blades (*n, o*); a flake serrated like a saw (*p*); a blade made from a large spawl (*q*); two end scrapers (*r, s*); and the tip end of a projectile point bearing a channel on both faces (*t*). It is probable that the latter specimen was a true fluted projectile point. Concerning the burins, examination discloses that suc-

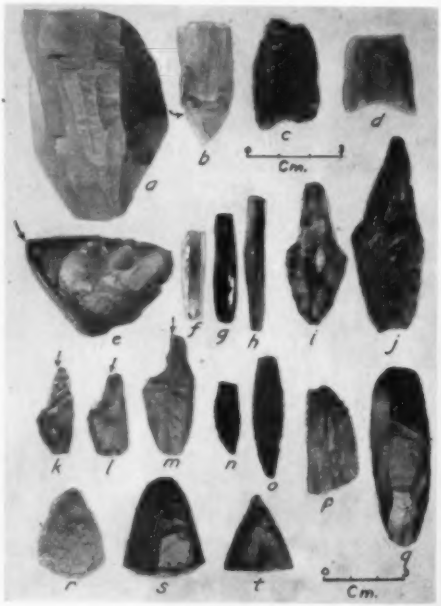

FIG. 36. Artifacts from northern Alaska described in the text. *a-d*, from the Kugururuk River area; *e-q*, from near Anaktuvuk Pass.

cessive flakes were detached from one end forming a niche (see arrow, Fig. 36, *k*, *l*, *m*). The use of these objects as burins appears to be a secondary adaptation, since they show original preparation and use as side and end scrapers.

Our growing body of evidence seems then to indicate that the pass routes through the Brooks Range in northern Alaska were traversed by some of the earliest culture bearers in that part of the northern continent. The fact that these early manifestations were found in glaciated areas conclusively points out that these sites were occupied within post-glacial times. Exactly when this occurred we cannot tell until datable evidence has been recovered.

BIBLIOGRAPHY

Giddings, J. L., Jr.

1949. Early Flint Horizons on the North Bering Sea Coast. *Journal Washington Academy of Science*, Vol. 39, No. 3, pp. 85-90. Washington.

Krieger, Alex D.

1947. Artifacts from the Plainview Bison Bed (pp. 938-54). In E. H. Sellards, Glen L. Evans, and Grayson E. Meade, "Fossil Bison and Associated Artifacts from Plainview, Texas." *Bulletin Geological Society of America*, Vol. 48, pp. 927-54. New York.

Solecki, Ralph S.

1950. A Preliminary Report on an Archaeological Reconnaissance of the Kukpowruk and Kokolik Rivers in Northwest Alaska. *American Antiquity*, Vol. 16, No. 1, pp. 66-9. Menasha.

Solecki, Ralph S., and Robert J. Hackman

1951. Additional Data on the Denbigh Flint Complex in Northern Alaska. *Journal Washington Academy of Science*, Vol. 41, No. 3, pp. 85-8.

Ralph S. Solecki
Smithsonian Institution
Washington, D.C.

January, 1951

A METALLOGRAPHIC STUDY OF CERTAIN PRE-COLUMBIAN AMERICAN IMPLEMENTS*

A metallographic study was made of certain large native copper implements to determine the methods of manufacture. Metallurgical knowledge of the diffusion of oxygen into copper, the recrystallization of copper, and the working characteristics of copper are used in this analysis. The artifacts analyzed are listed below. The Wisconsin Historical Museum catalog numbers of each specimen is also given.

Copper chisel, ridge back, from Wisconsin (A 4124), copper chisel from Minnesota (A 4119), float copper from Wisconsin (A 4241), copper axe from Wisconsin (A 4099), copper spud from Wisconsin (A 4147).

To obtain evidence concerning the fabrication of the artifacts, the internal structure of each was investigated. A rectangular portion approximately ⅝" by ⅝" by ½", centrally located, was sawed from each implement. The inner longitudinal face, with respect to the artifact, was then ground, polished and finely polished on a fast revolving cloth wheel using alundum abrasive. These surfaces were etched with fresh solution of ammonia and hydrogen peroxide (6cc. NH_4OH: 4cc. H_2O_2). Photomicrographs (Fig. 37, *a*, *b*, *c*, *d*, and *f*) were then taken of these surfaces. For a comparison with the structures of the artifacts a specimen of oxygen-free high conductivity copper and one of lake copper, as-cast, were treated similarly (Fig. 37, *g*, *h*). In the case of artifact A 4119 a microphotograph was taken of an unetched surface, where there was a crack near the surface of the implement (Fig. 37, *e*).

All the artifacts that were examined had a thick coating of patina, resulting from long burial in the earth. Upon visual examination all the artifacts except A 4124 looked to have been wrought. The surface of this specimen, beneath the patina, showed what appeared to be metal penetrations or "rat tails," which might have been the results of casting into a mold. The possibility that some of the implements might be in the as-cast condition recommended metallographic examination for columnar growth and oxide inclusions.

The metal from which the artifacts were made resembles float copper very closely in the absence of nonsoluble metallic inclusions. In European copper impurities occur along the grain boundaries, as inclusions visible on microscopic examination (Phillips, 1925, 1926). The metal in this case exhibits a marked decrease in workability. The native American float copper more nearly resembles the oxygen free high conductivity copper (Fig. 37, *g*) in its structure. The artifacts indicate a high degree of purity, and it seems evident that they are of American origin.

On examination none of the specimens from the implements exhibits any indication of columnar growth (Fig. 37, *a-d*) (Northcott, 1946; Doan and Mahla, 1941; Barrett, 1943, Seitz, 1943). The specimens show an irregular structure with randomly oriented grains and annealing twins. This indicates that recrystallization of the metal has occurred (Van Wert, 1932; Mathewson, 1928; Jefferies and Archer, 1924; Metals Handbook, 1948). Since an elevated temperature of about 200°–225° centigrade is necessary for recrystallization on previously strained copper, it is obvious that heat has been used in the manufacture of the implements. Figure 37, *h* is an as-cast copper specimen that has been cast by modern methods. It shows long columnar growth and numerous large oxide inclusions. The evidence demonstrates that none of the implements is in the as-cast condition.

The possibility of lamination was considered. If lamination was the method of manufacture, the microstructure of the successive sheeting of welded metal would show up very plainly. It is evident upon examination of the microphotographs that the implements were not made in this manner.

* The author wishes to thank Miss Suzanne W. Miles, former curator of archaeology and ethnology, Wisconsin Historical Museum, for suggesting the subject of this paper, and also to express appreciation for the loan of the artifacts from the Wisconsin State Historical Society. Grateful acknowledgments are due to Professor David Mack of the Department of Metallurgy of the University of Wisconsin, for much valuable advice and assistance given, and to the Metallurgy Department for the use of facilities.

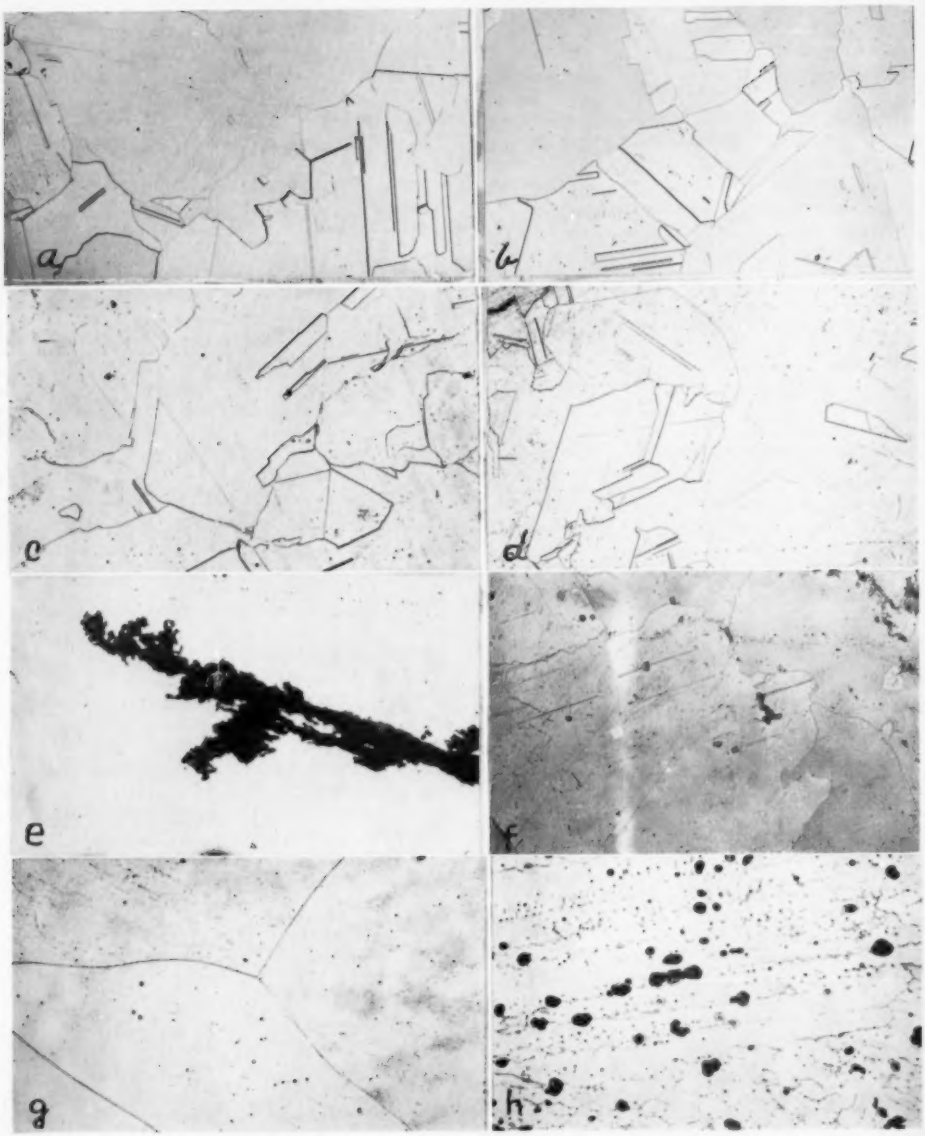

FIG. 37. *a*, Artifact A 4124, 40 magnifications. This structure is free from non-soluble metallic inclusions, exhibits twinning planes and is comparatively free of oxide inclusions. The same type crystal structure is evident in all artifacts examined; *b*, Artifact A 4119, 40 magnifications; *c*, Artifact A 4099, 40 magnifications; *d*, Artifact A 4147, 40 magnifications; *e*, Artifact A 4119, 40 magnifications. Unetched. Cracks extending inward from the surface of the artifact. The metal is relatively free of oxide inclusions in the area around the cracks and indicates that the metal was not held for an extended time at a high temperature; *f*, Float copper A 4241, 40 magnifications. This structure shows few twinning planes and large equiaxed grains. It is free of non-soluble metallic inclusions; *g*, oxygen free high conductivity copper, 40 magnifications. This specimen exhibits large regular grains and few oxide inclusions; *h*, As-cast copper, 40 magnifications. This specimen exhibits columnar growth of grains and shows the oxide inclusions which occur during normal casting operations.

It is suggested that the natives obtained large pieces of float copper and by some means hammered the metal into the desired shape.

The next point to determine is, to what extent was fire used to anneal the metal? Since 90% reduction is a maximum amount of reduction of copper between anneals, it is likely that annealing was used in order to continue shaping the implement. To restore ductility for further working, the annealing temperature of 200°–225° centigrade must be reached. Pure copper that has been held at an elevated temperature in air, exhibits a layer of oxide particles precipitated beneath the surface of the metal (Rhines, 1940; Meyer and Elliott, 1948). Therefore, if the artifacts had been held in air at a high temperature for any length of time, an appreciable amount of oxide would have diffused inward into the metal. The rate of oxide diffusion can be used as a measure of the length of time that the implement was held at a high temperature. On the other hand, if a sufficiently reducing atmosphere was maintained by charcoal, or other means, the oxide diffusion would not occur. Figure 37, *e* shows no oxide diffusion inwards from the crack. This means that during the life of the crack, providing no reducing atmosphere was present, the implement had never been held at an elevated temperature for any length of time. Since the temperature of a luminous flame is about 350° centigrade and any wood flame produced under normal conditions has a comparable maximum temperature, it is fairly safe to say that an ordinary open wood fire was used to heat the copper in the process of manufacturing the implements. Bellows could not have been used, nor any other method of raising the temperature any considerable amount, for under such conditions the copper would melt, at least at the surface; there is no indication of this having occurred.

Conclusions: Examination of certain copper implements from the Northern Lakes area showed, upon metallographic examination, that:

1. The implements were probably of native American origin.
2. None of the implements presents any evidence of having been cast.
3. None of the implements was made by lamination.
4. The implements may have been shaped by hot working or by cold working and annealing, but they could not have been fabricated without repeated heating for recrystallization; the heating was probably accomplished by using an open wood fire.

BIBLIOGRAPHY

Barrett, Charles S.

1943. *Structure of Metals*, pp. 288, 307, 420. New York and London.

Doan, Gilbert E., and Elbert M. Mahla

1941. *The Principles of Physical Metallurgy*, pp. 84-107. New York and London.

Jefferies, A. and R. S. Archer

1924. *The Science of Metals*, pp. 85-144. New York and London.

Lyman, Taylor, ed.

1948. *Metals Handbook*, American Society for Metals, pp. 843-909. Cleveland.

Mathewson, C. H.

1928. Twinning in Metals. *Proceedings of the Institute of Metals Division, American Institute of Mining and Metallurgical Engineers*, pp. 36-46. New York.

Meyer, C. L., and V. E. Elliott

June 1948. A Method of Determining the Origin of Surface Defects on Rolled Steel Products. *Metals Technology, American Institute of Mining and Metallurgical Engineers*. Vol. 15, No. 4, *Technical Publications* No. 2368. New York.

Northcott, L.

1946. The Influence of Macrostructure upon Segregation, and Dendritic Structures of Columnar Crystals. *Journal of the Institute of Metals*, Vol. 72, *Paper* 1010, pp. 31-50, *Paper* 1020, pp. 283-91. London.

Phillips, George B.

1925. The Primitive Copper Industry of America, Part I. *Journal of the Institute of Metals*, Vol. 34, No. 2, pp. 261-70. London.

1926. The Primitive Copper Industry of America, Part II. *Journal of the Institute of Metals*, Vol. 36, No. 2, pp. 99-106. London.

Rhines, Frederick N.

1940. A Metallographic Study of Internal Oxidation in the Alpha Solid Solutions of Copper. *Metals Technology, American Institute of Mining and Metallurgical Engineers*, Vol. 7, No. 2, *Technical Publication*, No. 1162. New York.

Seitz, F.

1943. *The Physics of Metals*, pp. 56, 102, 435. New York and London.

Van Wert, G.

1932. *Introduction to Physical Metallurgy*, pp. 210-15. New York and London.

Leonard Frank
College of Mining and Metallurgy
University of Wisconsin
Madison, Wisconsin

May, 1950

Note

In reading the papers by Miss Miles (*American Antiquity*, Vol. XVI, No. 3, 1951) and Mr. Frank a thought has occurred to the writer that may be significant. These copper artifacts were apparently fashioned by a series of operations involving cold working by hammering followed by softening anneals or by a series of hot working operations. The metallurgical evidence cannot decide positively between these two possibilities, although the first seems more probable.

When copper is worked at ambient temperatures it becomes progressively harder, stronger, and more resilient (springy) and results in characteristic changes in

structure. If this working is continued long enough the copper becomes so hard and resilient that further working becomes very difficult and usually leads to cracking and fracture. Copper which is hot worked does not exhibit this change of properties or microstructure, remaining soft and plastic.

Certainly, the peoples who made these artifacts would have observed the favorable progressive change in properties during cold working and would, hence, presumably have used a cold hammering operation as the final step in manufacture. Since none of the artifacts examined by Mr. Frank showed any evidence of such cold working, the logical conclusion is that the artifacts must have been made by hot working. An alternative possibility is that the peoples used cold working with intermediate softening anneals but failed to recognize the significant improvement in properties during cold working and used a softening anneal as a final step.

David J. Mack
Asst. Professor of Metallurgical Engineering
University of Wisconsin
Madison, Wisconsin
March, 1950

The Board of Directors announce that

the name of

The Viking Fund, Inc. has been changed to

Wenner-Gren Foundation for

Anthropological Research, Incorporated

BOOK REVIEWS

Early Man in the New World. KENNETH MACGOWAN, with drawings by Campbell Grant. The Macmillan Company, New York, 1950. Pp. 260, numerous figures and maps. $5.00.

Here is the first general book on the origins of man and culture in the New World which can be recommended to amateur and professional anthropologists alike, as well as the casual reader. The few preceding works on this subject have been partly factual, largely fanciful, and dangerously misleading to those without enough background to separate one from the other.

Macgowan has drawn on a great number of sources in both the Old and New Worlds, read them carefully, and skillfully extracted their essential ideas, welding the whole into a coherent story in a vigorous style that is free of over-technical language. He holds no bias for any particular point of view, nor does he try, like so many others, to "prove" that man entered the New World at any specific date. His aim at every turn is to show his readers what arguments are involved, what ideas have been advanced, the presented evidence for and against the various theories, and the crucial points on which more evidence is needed.

An "amateur archaeologist" himself, Macgowan was already famous as a first-rate producer of plays and motion pictures before he began his studies of ancient man. As one of those who aided him with certain chapters, I must confess to having held grave doubts that anyone steeped in motion picture techniques could step into a vastly complicated scientific field and do even a passable job of explaining it accurately and effectively to the public. In this case, however, the result surpasses what we could hope for from even a professional anthropologist. This is due in part to the author's acute mind and unusual writing skill, and in part to his willingness to have those professional men with special knowledge read his chapters and criticize them freely before publication.

The book contains a good deal of simplified data from the Old World which are used to draw comparisons in culture traits and time perspective with the general developments in the New World. While American anthropologists have ready access to numerous accounts of prehistory in Asia and Europe, the reverse is not true; *Early Man in the New World* is perhaps the only account outside of institutional journals that can serve as a guide to the manifold problems of American prehistory.

It must be repeatedly emphasized that the problems of man's entry into the New World — his racial origin, earliest culture traits, the time of entry and the directions of migration — are only beginning to shape up. The number of reliable "early man" excavations in North and South America is very, very small in proportion to the vastness of the land and the diversity of environment. Further field work will undoubtedly turn up new complexes and fill out the inventories of culture complexes already partly known. Unpublished discoveries in the past three or four years have produced new data on culture and climatic stages; the method of radiocarbon dating has produced some changes and will produce more. Macgowan's treatment of all these matters is fair and unbiased, but I wish to stress that his charts and correlations of artifact types with extinct animal species must be read with full understanding that changes are to be expected — and soon.

Archaeologists have been much too ready to accept uncritically the idea that all the animal remains and artifacts from one site or stratum provide a direct association. Thus, in Sandia Cave, New Mexico, it is usually thought that the human beings who made Sandia points lived contemporaneously with all the mammals represented in the stratum which contained these artifacts. Such associations are not, however, borne out elsewhere, and there is a strong possibility that some of the animal remains were introduced secondarily for the greater part of the cave has broken off and the part now seen is only a remnant. The activity of man himself in such a cave, digging fire pits, can account for older fossils being moved upward.

Again, the paleontologists are discovering more and more evidence of some succession in the order of disappearance of certain species; for example, the mastodon and saber-toothed cats may have been the first to become extinct, followed by the mammoth, then by horses, camels, and perhaps some others, while the ground sloth, large Pleistocene bison, and dire wolf possibly survived the longest. It should be obvious that all species did not become extinct simultaneously in any one area, and no one species became extinct suddenly in all parts of the New World. A great deal of work remains in correlating specific artifact types with particular mammals, and in dating these associations more accurately. Thus, Macgowan's table on pages 137-139 and chart on page 141 are certainly due for revisions in the near future, awaiting better control in excavation and dating.

With all of the speculations on the causes of extinction in the late Pleistocene, no one seems to have paid adequate attention to destruction of food supplies as the result of climatic changes, increased competition between the species for the dwindling resources, and consequent disturbance in the whole balance of nature. Man undoubtedly accelerated the process, but neither man nor fire can have had a fundamental role in starting it.

The amateur and professional alike will probably despair over Chapter 9 (Pygmies, Australoids, and Negroids—Before Indians?). As in his other chapters, Macgowan has assembled the published ideas and tried diligently to make sense of them. In this case, however, no one could. The chapter is a beautiful example of the nonsense that pervades this problem. Not only do the various investigators have different ideas as to what are "Mongoloid," "Negroid," "Australoid," etc., characteristics, but they all apply these in different ways to

the Indian populations, trace them to different Asiatic populations, and in general create more confusion than if they said nothing.* Possibly some day the physical anthropologists can tell us how many different types of American Indians there are, or were, who their closest relatives were in the Old World, and where, what branchings took place after arrival of the various strains in America, etc., but the day seems far off. With only two or three exceptions, investigators in this field pay scarcely any attention to archaeological complexes and time factors, believing that order will appear from chaos if they keep measuring skulls and calculating averages.

The book is not confined to evidences of "early" man in America. Chapter 10 cites numerous parallels in specially shaped artifacts between eastern Asia and the western Pacific and America, most of them probably of comparatively recent date. Chapter 11 deals with problems of agricultural origins. Macgowan has kept up to date on recent developments, both archaeological and botanical, which indicate that some American plants may well have been introduced from Asia — a possibility which American anthropoiogists have gone out of their way to deny for many years. Suffice it to say that this problem is now wide open and getting more interesting daily.

In conclusion, there are specific points all through the book over which one could pick a bone with Macgowan — but it is always necessary to remember that they are matters on which the professionals can reach no concrete agreement. The book is a real service to anthropology and Macgowan is to be highly complimented for his insight and perseverence.

ALEX D. KRIEGER
University of Texas
Austin, Texas

Archeology of the Florida Gulf Coast. GORDON R. WILLEY. Smithsonian Miscellaneous Collections, vol. 113. Washington, 1949. Pp. XXXIII + 599, 60 pls., 76 figs., 20 maps, 17 tables.

By the end of 1950, only about a dozen publications in American archaeology might be said to stand as monumental contributions from the points of view of prodigious industry, presentation of new data, good organization, balanced interpretation, and clear writing. Of these, the reviewer regards Gordon Willey's great volume on the Florida Gulf Coast as perhaps the best of all. I say "perhaps" only because it is not easily compared with those of somewhat different purpose or scope. It is not only a report on many sites, and a reconstruction of historical trends, but also the best example so far of archaeology interpreted for the benefit of the ethnologist who wishes to know population densities, social structure, and cultural development leading up to the historic level.

The stated purposes of this monumental study are: to provide a complete and integrated synthesis of Florida Gulf Coast archaeology to the present date, which may serve as a base of departure for future researches; to reconstruct "culture growth" in this region; and to reconstruct culture in relation to environment, economic life, population density, community life, and time durations. These aims are accomplished with outstanding success, even though some need for revisions is already apparent. That is, radiocarbon datings in related cultures have already shown that Willey's estimates on absolute chronology are too conservative and his period durations must be extended; but the important thing is that Willey has struck out boldly to calculate population densities from the archaeological data while elsewhere we only hear continued pleadings that archaeologists *ought* to concern themselves with such problems —but never get around to it.

The area treated includes 27 Florida counties extending from the extreme western tip eastward and southward around the Gulf to Charlotte Harbour, a minimum distance of 500 miles along the outer shore. The study extends well inward from the coast and includes eight sites in adjacent Alabama and Georgia. The area is subdivided into the Northwest coast, Central coast, and Manatee region.

An astonishing number of amateur and professional investigations have been carried out in various parts of Florida for over 100 years. These are traced on pp. 15-34 with comments on how they have contributed to present knowledge of Florida Indian history.

On pp. 37-101, six of the 87 sites located by Willey and R. B. Woodbury in their 1940 survey of the Northwest coast are analyzed in detail. These (Carrabelle, Mound Field, Sowell, Fort Walton, Gulf Breeze, and Lake Jackson) are of vital importance in the whole study, for on them "the ceramic and cultural chronology of Gulf Florida is essentially established. . . ." Maps, trench profiles, site composition and stratigraphy, burial data, lists of pottery types and other artifacts, percentage tables, bar graphs, and chronological notes are given for each site.

On pp. 103-93, eleven more sites are described as to structure, excavations, burials, physical anthropology, pottery, other artifacts, and historical position. These are in the Manatee region and adjacent Central coast, and "differ from those of the Northwest coast in that they are, for the most part, investigations of burial mounds rather than refuse middens." Their exploration was carried out under the Bureau of American Ethnology from 1923 to 1936 by several persons: Fewkes (Weeden Island site), Stirling (Safety Harbor), Holder (Thomas, Cockroach Key), Simpson (Thomas), Newman (Perico Island, Englewood, and Reichard (5 Parrish mounds). From their field notes and collections Willey has compiled a great amount of data, concisely written, and summarized on pp. 182-93.

* Editor's note.—Compare the equally sharp discussion, but more critical of the author's handling in the review by T. D. Stewart in *American Journal of Physical Anthropology*, Vol. 8, No. 4, December 1950, pp. 513-15.

The next part, pp. 195-350, presents structural data, pottery counts, and artifact lists on many more sites in which smaller excavations and surface collections have been made by many persons, chief among them the indefatigable Clarence B. Moore. These are taken up in order, by counties, from Perdido Bay at extreme western Florida around the Gulf curve to Charlotte Harbour on the south. A summary and chronological chart is found on pp. 346-50, including a list of the number and kinds of sites assigned to each culture period.

Section VI, pp. 351-516, is a description of Florida Gulf Coast culture periods, *i.e.*, a horizontal synthesis of all the site data. The broad scope of each period study is indicated by the subheadings: Period definition, The sites, Settlement pattern, Economy, Organization of society, Disposal of the dead, Ceramic arts, Other arts and technologies, Speculations on population and period duration.

The culture periods defined in section VI are all ceramic. Beginning with the earliest they are: Deptford, Perico Island, Santa Rosa—Swift Creek, Weeden Island, Fort Walton, Englewood, Safety Harbor, and Leon—Jefferson. The last mentioned is full historic, dated about 1650–1725. Fort Walton and Safety Harbor extend into early historic times but are also "aboriginal"; and Englewood, a brief period, may have lasted for "a few decades after A.D. 1500." The remainder are wholly pre-European, with Willey beginning the Deptford around 700 A.D. Footnotes are added to indicate that he now considers such a date may be much too late.

As preceramic sites are excessively rare in Gulf Florida (Waring has reported the only known site, p. 351) the present volume is entirely a study of ceramic cultures. The few fiber-tempered sherds so far found in Gulf Florida sites appear with the characteristic Deptford and Perico Island potteries, and no separate horizon for this ware (such as the Orange period in northeast Florida) has been identified. Deptford and Perico Island are believed to have lacked agriculture, but this may have been known in the following Santa Rosa–Swift Creek period because this is comparable in many ways with Hopewellian in development (p. 368).

Each of the period studies contains a number of detailed pottery-type descriptions in the standard form of the southeastern United States. This section alone would be an invaluable handbook to the potteries of this region, previously undescribed, for it includes 95 types and "varieties," many splendid sketches of outstanding vessels, designs, and rim profiles. Much of the Gulf Florida pottery undoubtedly ranks high among the superior crafts of the entire New World.

Appendix A to this section is a careful definition of the chief vessel forms and their size ranges, of which 52 examples are given in Figs. 69-72. Bowls, jars, bottles, composite forms, full effigies, bowls with effigy appendages, "beakers," and "pots" are represented in many varieties.

Appendix B is a numbered listing of the established traits for each culture period, an extremely convenient guide for comparative purposes. That population, technology, and societal organization all reached their maximum development during Santa Rosa–Swift Creek and Weeden Island times, followed by gradual decline, can be seen in the number of traits listed per period: Deptford, 18; Perico Island, 27; Santa Rosa–Swift Creek, 88; Weeden Island, 104; Fort Walton, 57; Englewood (brief period), 27; Safety Harbor, 49; Leon–Jefferson, 25.

Section VII, pp. 517-35, is a condensed account of Florida ethnohistory. Two contrasting periods of European influences are recognized, first that of adventurers and explorers from about 1500 to 1633, and second, that of colonization beginning with the Spanish mission system established in 1633. The really disastrous effects of Europeans in Florida began only with the latter. "The reality of these two periods of European contact . . . is clearly reflected in the archeological cultures of the northwest coast. The earlier Fort Walton culture, though in occasional contact with the Spaniards, is thoroughly native and integrated; the later Leon–Jefferson culture, on the other hand, is one which has been turned from its old channels and is undergoing rapid acculturative change" (p. 522). The two historical periods provide rather definite chronological anchors for the upper end of the time scale in Fig. 76.

There follow numerous quotations from early documents which provide connecting links between certain recorded customs and population estimates for Florida tribes, and the archaeological observations.

The last section, Conclusions (pp. 537-83), consists of the subsections: Cultural Continuities (Settlements, Economy, Society, Technology), Peoples (a chapter on the physical anthropology by Marshall T. Newman), Extra-Areal Contacts and Affiliations (discussed separately to the south, east, north, west and north, and West Indies), Time-Space Integration, Summary Reconstruction, and Trends (eight final, over-all tendencies through the periods). There is no point in trying to review these final sections, for every student of archaeology must read them thoroughly and repeatedly for himself.

Now, I will cite some matters which seem to me either insufficiently explained or somewhat inconsistent. Willey has properly worded and qualified his statements to leave the door open for alternative interpretations; yet it can be taken for granted that he will be misquoted by those who like only the "definite" lines.

Probably the most common assumption in all "historical reconstructions" is that *a trait originated where it is most common or most elaborated*. A little reflection shows that this need not be true unless *well-controlled chronology* shows that it is. Failing such control, other hypotheses are equally valid. The trait may be very common or highly elaborated in one culture simply because those people developed great interest in it — "made something of it" — while others did not or could not. Rarity or simplicity, on the other hand, might indicate a marginal fading out of an idea, ineffective use of it, inferior technology, or merely an

undeveloped, incipient stage of the idea. Apparent degrees of commonness *versus* rarity may, of course, also result merely from relative amount of field exploration.

Willey sees considerable ceramic influence passing from Gulf Florida to the Troyville and early Coles Creek cultures of Louisiana during Weeden Island I, and to Coles Creek proper during Weeden Island II. Conversely, the temple mound concept, which was highly developed in Troyville and Coles Creek, is thought to have spread eastward, but much more slowly since it does not appear prominently (if at all) in Gulf Florida until the Fort Walton period. In both cases the direction of movement is again deduced from relative elaboration in the two areas. Speculations carried farther into the interior and with more exact datings might alter the picture of these and other trait diffusions. At any rate, Fort Walton is assigned to a Temple Mound II stage, while Santa Rosa–Swift Creek, late Perico Island, Weeden Island I and II, Englewood, and Safety Harbor are all assigned to Burial Mound II. Thus a Temple Mound I stage is missing from Gulf Florida and closely adjacent areas, unless it would be possible to use the term here without the actual presence of temple mounds.

Nothing could demonstrate better the terrible need for a single agreeable system of cultural stages for the whole Eastern United States. This is a task for all archaeologists to solve. Time periods must not be confused with cultural periods, and the latter must be characterized by traits over which there is some good temporal control. While there is some tendency now to recognize an Early and a Late Mississippi period as equivalent to Temple Mound I and II, respectively, the "Early" part of it is extremely vague and the "Late" part of it is used interchangeably with "Middle Mississippi," a term with little if any meaning. Generally speaking, Late Mississippi or Temple Mound II can most easily be recognized by the appearance of shell tempered pottery. There remains a great deal of Mississippian or Temple Mound material in which shell temper does not occur, but which has yet to be brought together.[1]

Returning to the supposed time gap between Santa Rosa–Swift Creek and Weeden Island I in Florida on the one hand and Mississippi and Caddo on the other, I feel that they will be brought into continuity when the whole Early Mississippi or Temple Mound I stage is better defined. Once the Eastern archaeologists drop their insistence that all Mississippian culture is as late as 1200 A.D. (or even 1500 A.D.), many puzzling situations become clearer. In the "Caddoan area" there is no doubt that both Temple Mound I and II are represented by considerable material, and there is some evidence that the beginnings go back several centuries farther than previously supposed.[2]

If, then, Santa Rosa–Swift Creek was contemporaneous with Ohio Hopewell before Christ, or even with the end of Hopewell, Weeden Island I must have begun long before the 1000 A.D. estimated by Willey; and Fort Walton, even though extending into the 16th century, must have had beginnings some centuries before 1500 A.D. In ceramic development and many other respects, Weeden Island I and II could be included in the Temple Mound I or Early Mississippi stage, with the qualification that temple-mound construction here lagged far behind.

Space will not permit a discussion of the pottery typology, but suffice it to say there are still many problems in defining type ranges and eliminating what may prove to be superficial types based (in some cases) on only a few sherds. My chief criticism of Willey's approach is that he makes the types static entities, "classified as components of one complex or the other" (p. 6). By establishing broader types with more internal varieties, as he did in a few cases, the typology could be made to reflect rather than to submerge the cultural continuum through the different periods. The setting up of new type names for each period has the opposite effect.

ALEX D. KRIEGER
University of Texas
Austin, Texas

The Safety Harbor Site, Pinellas County, Florida. JOHN W. GRIFFIN AND RIPLEY P. BULLEN. Florida Anthropological Society, Publication No. 2, 1950. Pp. 37, 4 plates, 2 text figures.

Safety Harbor is the probable ancient capital of a Timucuan-speaking group known as the Tocobaga. This tribe occupied a section of the Florida central Gulf Coast in the 16th and 17th centuries. The Tocobaga were agriculturalists who had some sort of city-state or town-state organization with authority vested in chiefs residing in these principal towns. They built platform mounds, surmounting them with the chief's house or with temples, and they also took a profound interest in the secondary treatment of the dead who, after boiling and dismemberment, were put away in burial mounds. Menendez visited the Tocobaga in 1567; thereafter they had no mass visitations from the Spanish until 1612. Presumably their troubles began in earnest at that date and continued until the final dissipation of their native culture after 1700.

[1] The divisions of Early, Middle, and Late Woodland, and Early and Late Mississippi have recently been elaborated and discussed in historical terms by Griffin, James B., "Cultural Change and Continuity in Eastern United States Archaeology," in *Man in Northeastern North America* (edited by Frederick Johnson), Papers of the Robert S. Peabody Foundation, Vol. 3, 1946. Andover, Mass.

[2] Newell, H. Perry, and Alex D. Krieger, The George C. Davis Site, Cherokee County, Texas. *Society for American Archaeology Memoir* 5, pp. 193-224, 1949.

The report under review is concerned with Florida Park Service excavations at Safety Harbor carried out by the authors in 1949. It is the only thoroughly documented account of work at the site. In general, it substantiates conclusions which the reviewer drew from the earlier (1930) Safety Harbor excavations of Stirling (see Willey, "Archeology of the Florida Gulf Coast," *Smiths. Misc. Colls.*, vol. 113, pp. 135-142), but it adds considerably to the record. A site map, heretofore lacking, is included, and there is some stratigraphic evidence for chronological change within the Safety Harbor culture as previously defined. Further, Griffin and Bullen have pointed up problems in ceramic typology and the chronological and distributional implications of certain pottery types. Nothing was found, however, which would nail down the claim that Safety Harbor is the site of historic Tocobaga.

The authors are in agreement with me that Safety Harbor bears a partial contemporaneity with the Ft. Walton period of northwest Florida but that it also continues somewhat later equating, in part, with the Leon-Jefferson period. They experienced some difficulty in the segregation of one strain of pottery, which is most similar to Ft. Walton, from a second important strain which is more remininiscent of the earlier Weeden Island period. The first group is the type, Pinellas Incised; the second group the type Safety Harbor Incised. They were, however, able to bring new data to bear on this question from stratigraphy and typology at the Lake Jackson site in northwest Florida (see J. W. Griffin, "Test Excavations at the Lake Jackson Site," *American Antiquity*, 16:2, pp. 99-112). These data show Pinellas to be a late type, chronologically following the Ft. Walton pottery types at Lake Jackson. I would agree with them that Pinellas is a northern type which moved south into the central Gulf Coast and Manatee regions to become a part of the Safety Harbor complex.

GORDON R. WILLEY
Peabody Museum
Harvard University

The Rubber-Ball Games of the Americas. THEODORE STERN. Monographs of the American Ethnological Society, XVII. J. J. Augustin, New York, 1948. 122 pages, 7 maps.

This monograph, originally a doctoral discussion before the University of Pennsylvania Department of Anthropology, assembles known data on American Indian rubber-ball games, stressing distributional, historical and comparative aspects. The introductory chapter includes a summary of the distribution of native rubber plants. Three chapters give detailed information pertaining to the games, tribe by tribe, for three geographic regions — South America, the Antilles and Central America, Mexico and the southwestern United States. The concluding chapter points out the weaknesses inherent in the data, summarizes the evidence, and presents correlations. A very complete bibliography is listed, and seven maps at the end of the monograph give a graphic summary of distributional data pertaining to the ball, methods of play, features of the playing fields, competitive characteristics, and types of games.

Stern presents his material and problems clearly, pointing out in the beginning that two categories of rubber-ball games exist, one a competitive game between teams and the other a "circle" game, so designated because of the ring formed by the participants. His main concern is with distribution and he is cautious as regards the time-space aspects, pointing out a relative lack of data on this phase of the problem. Contemporary European games, from which terms were borrowed by the Spanish in first describing the ball games encountered, are referred to, in order to eliminate any possible misinterpretation in terminology. Throughout the text original sources, some of which are offered in translation for the first time, are liberally quoted.

In tentatively summarizing the material, Stern indicates there are few occurrences of rubber ball games outside the range of the natural supply of rubber and, conversely, not all rubber-bearing areas reveal ball games. He notes that the ecological determinants of the circle and competitive games are far from conclusive, though the latter game seems to be confined to agricultural peoples; social institutions do not exhibit any apparent correlation. On the other hand, a possible correspondence between team play and political organizations is offered, and also a somewhat weak correlation with the warfare patterns of Maya-Mexico. That there is no evidence of an over-all religio-ceremonial content as being basic in the spread of ball games is indicated. Stern concludes that present data appears to favor the circum-Caribbean area as the probable source of origin of the competitive-team rubber-ball game.

It is felt that the available data on the time-space aspect of the problem could have been used to more advantage, since the majority of the material deals with historic observations. Corbett has indicated that the prehistoric ball court may have had at least two routes of diffusion out of the Maya area, and the reviewer, whose material was not available to Stern at the time of his writing, has also indicated north and south movements out of the Hohokam area in prehistoric southwestern United States.[1] The data presented by Stern concerning the Cahita and Acaxee in northwestern Mexico is a case in point, wherein the courts appear to manifest stronger Southwestern rather than Mexican

[1] J. M. Corbett, Master's Thesis, University of Southern California, 1939; A. H. Schroeder, "Cultural Implications of Ball Courts in Arizona," *Southwestern Journal of Anthropology*, Vol. 5, No. 1, Spring 1949.

affinities and may represent a southward-moving backwash, along an earlier route of diffusion north, rather than a northern extension of the Mexican influence at a late date. Stern's conclusions pertaining to origins might have been placed on a firmer footing had he considered time-space relations more fully.

In treating with the ball courts of Mexico, Stern brings up the problem of orientation, stating that excavated courts in the north manifest an east-west orientation and those in the south a north-south orientation, but he does not present evidence in support of this statement. If such a situation concerning this long-debated problem exists, the facts should be fully presented. Without details, one cannot judge whether orientation may have been constant along routes of diffusion, or else in point of time as in the Southwest.

A few minor typographical errors were noted in the spelling of tribal names in the text (Muinane and Araona, pp. 11-12) and the accompanying maps (Muinana and Aroana, map 1). One typographical error, however, leaves the reader at a decided disadvantage. Map 3, "Method of Striking the Ball," has the symbol h′′ in the key to represent a battledore, but no such symbol is noted on the map. Thus it is necessary to check through the entire text, since there is no index, to determine its distribution.

This monograph is a valuable assemblage of data, particularly welcome to those interested in ball-court problems. It is hoped that Stern will continue research along this line and treat more fully the time-space relations as well as the archaeological data.

ALBERT H. SCHROEDER
National Park Service
Boulder City, Nevada

Social Organization of the Western Pueblos. FRED EGGAN. University of Chicago Press, 1950. xvii + 373 pp., 10 tables. $6.00.

In an exceptionally well done monograph dedicated to analysis of the social organization of the western pueblos (Hopi, the Tewa village of Hano on First Mesa, Zuni, Acoma, and Laguna), Eggan has considered his material within frames of reference which concern several different branches of anthropology. The considerable mass of data, much of which he collected or checked in personal field work, is aligned primarily to illustrate his thesis that kinship terminology reflects the social thought pattern of the group rather than resting upon the mere exigencies of language and indiscriminate borrowing, and that these western pueblos, though varying somewhat in social structure, show but one fundamental organizational approach to the problems of existence.

Among those problems lie the matters of old and recent contacts with other tribes and with whites, historical change, and even the specific relationships of these modern villages and those of the Rio Grande to prehistoric archaeological groups, along the lines recently developed from different approaches by Erik K. Reed and myself.* The possible correlations of social structures and archaeological data make this volume of special importance to archaeologists as well as to those interested in regional ethnology and in the broad comparative study of the functional relationship of social mechanics to man's adaptative living within his physical environment and with his fellows.

Eggan ends his book with an attempt to place the Pueblo schemes of social organization in the wider picture of the Southwest and of the United States, but unfortunately at once runs into the problem of inadequate data for conclusive statements. *The Social Organization of the Western Pueblos,* one of the most important volumes of the past several years in social analysis and understanding, illustrates the need for careful collection of data and their arrangement into conceptual schemes, archaeologically and ethnologically, in order to derive not only the history of an area but also the general laws of social order, adaptation, and change.

FLORENCE HAWLEY ELLIS
University of New Mexico
Albuquerque

Nalakihu; Excavations at a Pueblo III Site on Wupatki National Monument, Arizona. DALE S. KING. With Appendices by VOLNEY H. JONES, CHARLIE R. STEEN, AND ROBERT S. HARRIS. Museum of Northern Arizona Bulletin 23, Flagstaff, 1949. 183 pp., 81 figs., 17 tables.

In this monograph King has described in minute detail the results of three and a half months excavation at a small, thirteen-room pueblo occupied during the latter part of the twelfth century and located at the foot of Citadel Butte on Wupatki National Monument. The project was conducted under the auspices of the CWA relief program in the winter of 1933-1934, but final publication was delayed primarily by the failure of the CWA to provide funds for the necessary laboratory studies. As a result, post-excavation analysis had to be conducted during the author's "spare time." King is to be congratulated for his tenacity in seeing the job completed and the thoroughness with which it was accomplished.

The report leads off with a discussion of the environment, including a detailed listing from the Monument herbarium, and a consideration of excavation methods employed. This is followed by a room by room description of the architectural features, subterranean pits located adjacent to the pueblo, burials, and a discussion of the artifacts recovered therefrom.

The data on pottery are presented primarily by means of tables and graphs, computed not only in terms of actual sherd counts but also in percentage by weight. This technique of determining the relative importance of pottery types in a site by weight is not only easier

* A discussion of the somewhat differing conclusions reached by Eggan, Reed, and me will appear separately.

and quicker, but also offers the added advantage of giving a clearer idea of the number of individual vessels representing each type in use at a site during any analyzed period.

Ceramically, Nalakihu was confusingly complex. Types ascribed to the Anasazi, Mogollon, and Patayan "roots" occurred in almost equal percentages. The remainder of the material culture was almost equally varied. King compares all the traits from Nalakihu with contemporary adjacent foci of the three roots in a unique table, not only listing all the traits for all the pertinent foci but also evaluating their importance as to whether they are present, rare, common or presumed. The results suggest either that trade was active and diverse or else, as King surmises, intermarriage between these groups was commonplace. It is unfortunate that more definite conclusions could not be offered, for Nalakihu exemplifies the cosmopolitan situation so evident in the Flagstaff area following the eruption of Sunset Crater about 1066 A.D.

However, the reader who is unfamiliar with the somewhat involved taxonomic terminology used by those studying the archaeology of the Flagstaff area will find this text difficult to assimilate. A brief introductory statement clearly formulating the areal and cultural manifestations embodied in the terms Chino, Elden and Klethla would be helpful. Nevertheless, Nalakihu remains a sound contribution to the prehistory of the Flagstaff area in particular and of the Southwest as a whole.

FRED WENDORF
Harvard University
Cambridge, Mass.

Surface Archaeology of Ixtlan del Rio, Nayarit. E. W. GIFFORD. University of California Publications in American Archaeology and Ethnology, Vol. 43, No. 2, 1950. Pp. viii + 183-302, 30 plates, 20 figures, 1 map. $2.25.

In 1931 the University of California purchased a collection of Mexican pottery and stone objects from Sonora, Sinaloa, Jalisco, and Nayarit. Included in the collection were fifty of the pottery figurines characteristic of the prehistoric culture of the Ixtlan del Rio, Nayarit, region. In 1946 Mr. Gifford visited Ixtlan, in order to become acquainted with the source of this excellent collection and to acquire sherds which would show the pottery types associated with the figurines. This paper contains the results of that visit.

No excavations were undertaken. Collections of archaeological specimens, pottery and stone, were obtained from the surface and exposed banks of sixteen sites in the vicinity of Ixtlan. An analysis of the potsherds thus obtained constitutes the bulk of the report, with a short section devoted to the stone artifacts recovered. This paper also contains a discussion and illustrations of the figurines in the University of California collection.

Based in part on stratigraphy, and also on stylistic grounds, three pre-Spanish cultural horizons are distinguished in the vicinity of Ixtlan. By a comparative study the culture of Ixtlan is linked with the Nayarit-Sinaloa coastal cultures of the north and with the Autlan-Tuxcacuesco cultures to the south, but also note is made of the fact that Ixtlan possesses much that is unique.

Gifford's Early period is distinguished by the pottery figurines and fine polychrome pottery. This period is equated with the Early and Middle Chametla periods of Sinaloa. Early Chametla, in turn, has been postulated to be contemporaneous with the Late Teotihuacan period in Central Mexico. Thus, Gifford is of the opinion that the Ixtlan figurine complex may be contemporaneous with Late Teotihuacan.

The Middle period contains certain pottery wares belonging to the Aztatlan complex, and also annular-base *molcajetes*, or chili grinders, pottery plaques, nubbin and flanged ware, and three-quarter grooved stone axes. The presence of the Aztatlan complex at Ixtlan bears out its wide distribution as originally supposed by Sauer and Brand. It is now reported from Guasave, Sinaloa, on the north to the Ixtlan, Nayarit, region on the south, and possibly related wares are to be found along most of the Jalisco coast.

The Late period is characterized by plain wares, bichrome wares, and tripod *molcajetes*. It is equated with Late, Middle, and (or) Early Chametla of Sinaloa and Late Autlan of Jalisco.

The archaeology of western Mexico is still so poorly known that all real contributions are very significant. Certainly this paper is a real contribution and Gifford has utilized his surface material to fullest advantage. The report is well written, excellently illustrated, and its importance is increased by the fact that it gives us considerable additional information on an area little known archaeologically.

It is only to be hoped, and here I echo the plea made by Gifford, that adequate and controlled excavations may be undertaken in the vicinity of Ixtlan, so that the relationships of the Ixtlan culture to the better known Mexican cultures may be established on a firmer foundation.

ROBERT H. LISTER
University of Colorado
Boulder, Colorado

La Ceramica de Monte Alban III A. IGNACIO BERNAL. Doctoral dissertation, Universidad Nacional Autonoma de Mexico, 1949. Mimeographed, 162 pp., 206 figs., 2 tables, bibliography.

What follows might be called a preview review, for it concerns the preliminary presentation of material which will form part of the definitive report on the pottery of Monte Alban, the enormous ancient site in Oaxaca that for many years has been under intensive excavation by Mexico's Instituto Nacional de Antropologia e Historia, under the leadership of Caso.

Monte Alban is of outstanding archaeological importance. It is so situated in the heart of the area of high Mesoamerican civilizations as to have been able to receive and disseminate influences from and to the Mixteca-Puebla region, the Valley of Mexico, the Gulf Coast, and the Maya country, both lowland and highland. Perched on a lofty ridge commanding the junction of fertile valleys, it was for many centuries a great ceremonial center. During its long and apparently unbroken occupancy, building was piled on building, numbers of elaborate tombs were constructed and richly furnished with mortuary offerings, many caches were laid down. There were thus produced stratigraphic conditions ideal for research on developments in architecture, sculpture, burial customs, and the minor arts.

As result of the work by Caso and his associates the cultural history of the site has been divided into five major periods: Monte Alban I to V, the first reaching back into pre-Classic times, the last extending nearly to the Spanish Conquest.

The present paper opens with discussion of the pottery of the transition between proto-Classic Monte Alban II and Monte Alban III A. Its major section has to do with the wares of the latter period, which saw the first local flowering of Classic culture. The material treated consists, for the most part, of complete vessels from tombs and caches, although the evidence of sherds from the stratigraphic tests has aided in the period assignments of tombs and caches. The vessels are well illustrated, fully described, and precisely located as to provenience.

The period of transition is believed by Bernal to have been a relatively short one. It saw the decline of pottery forms typical of Monte Alban II and the rise of the radically different forms characteristic of Monte Alban III A. The author does not believe the great changes that took place at this time in ceramic practise were due to a violent overturn, such as might have been brought about by conquest. He considers, however, the possibility of a peaceful penetration of people of Zapotecan stock; and he feels sure that there was a shift from south to north in the source of influences on Monte Alban pottery-making. The older, southern influence, that had been felt throughout Monte Alban I and II, he attributes to Mayoid cultures; the later, northern, to the potent central Mexican culture that centered at Teotihuacan.

On the basis of origin, Bernal makes a three-fold classification of the pottery typical of Monte Alban III A. One group consists of forms inherited from Period II, but with significant alterations. Most notable of these is the anthropomorphic burial urn, whose ultimate origin he suspects to have been Olmec. A second and larger group he believes to consist of local innovations. Its type fossil, so to speak, is a bowl, approaching the hemispherical in shape and decorated with carving or incising. The third group is characterized by Teotihuacanoid vessels: cylindrical pieces with slab feet, tall-necked *floreros*, and variously shaped specimens of Thin Orange ware. The introduction of these was due to the abovementioned northern influence. A number of the vessels were, indeed, actually imported from the north.

As has been said, the descriptions and illustrations of the pottery are admirable and further information on the typical III A carved ware can be had from the author's earlier paper, "La Ceramica Grabada de Monte Alban," published in vol. III of the *Anales del Instituto Nacional de Antropologia e Historia*. Here it suffices to say that, with the exception of a very few resist-decorated (negative) pieces, unpainted ware is overwhelmingly predominant.

For the non-specialist, the meat of the report is contained in the concluding section. It is there noted that by the time of Monte Alban III A all signs of Olmec influence had disappeared. Attention is called to stylistic resemblances between the carved decoration of III A bowls and that of Totonac stone sculpture. It is stated that no ceramic connections with the region north of the Valley of Mexico can be perceived. There follows a detailed comparison of III A pottery with that of Teotihuacan II and III and of the Esperanza phase of Kaminaljuyu in the highlands of Guatemala.

His conclusions, Bernal makes clear, are based on pottery alone and studies of other aspects of culture might well alter the picture. But, from the ceramic evidence, he infers that during the period in question Monte Alban, Teotihuacan, and Kaminaljuyu enjoyed intimate association; that the cultures of all three formed parts of a single greater development, each one evolving a distinctive style of its own. He accordingly believes them to have been politically independent entities that existed during a period sufficiently untroubled to allow free intercourse, both cultural and commercial. This, incidentally, coincides with the opinion held for some time by Miss Proskouriakoff and the reviewer that in early Classic times there was much more and much wider contact between the high Mesoamerican cultures than was the case in the later years of the Classic period.

Passing to questions of relative chronology, Bernal suggests that Monte Alban II-III, the period of transition, should be equated with the end of Teotihuacan II and the beginning of III. And, in the matter of absolute chronology, he would place Monte Alban III A between 200 and 600 A.D., the same centuries to which, on the basis of present knowledge, the Tzakol Phase of Uaxactun and the Esperanza Phase of Kaminaljuyu should also be assigned.

As the report is confined to the wares of a single period in the long history of Monte Alban pottery, the reader must take on faith Bernal's statements as to their relationship with those of earlier and later phases. But his obviously intimate knowledge of them and the evident soundness of the field methods practised at the site give one full confidence in the validity of his conclusions. His study of the specimens has been meticulous, but he has not allowed himself to become so immersed in detail as to have lost sight of the wider impli-

cations of his material. One awaits with keen interest the appearance of the full report. It will be an outstandingly valuable contribution to the study of Mesoamerican prehistory.

A. V. KIDDER
10 Frisbie Place
Cambridge, Mass.

Maya Hieroglyphic Writing: Introduction. J. ERIC S. THOMPSON. Pub. 589, Carnegie Institution of Washington, Washington, 1950. xvi + 347, frontispiece, map and 63 pp. of drawings and photographs. $7.00 paper, $7.50 cloth.

Readers tending to balk at recognizing "civilizations" in pre-Columbia America may nevertheless be inclined to allow the term for the Maya of Meso-America. The Maya present a special case because their priests developed a complicated calendrical mechanism for divination and prophecy, with arithmetical and astronomical overtones and an elaborate system of carved or painted characters for dealing with such matters. The glyphs are only partly understood, and because of the nature of what has happened to survive they can best be studied together with the calendrical complex and the religious philosophy behind them. For a maximum yield of information one must utilize documents in various Mayan and European languages of the sixteenth century and later, and studies of modern Mayan approaches to the supernatural, including surviving remnants of what has usually been thought of as the ancient calendrical machine. Hence this book is much more than its title might seem to imply, though the central theme is a search for meanings of hieroglyphs and the principles of their use. It is a masterpiece of synthesis in which the author's contributions are blended with those he finds acceptable in the work of others. He has consciously striven for good literary form as well as for sound science.

The basic drive may be summed up by quoting a passage from page 2: "A comparison of one civilization with another in the Old World will, therefore, not yield reliable criteria for the formulation of any laws that may govern human progress. For evidence of independent growth it is necessary to turn to the New World. . . . Naturally, the greater the progress, the greater the field for comparative study. One cannot weigh potsherds and flint points against the full range of Athenian civilization. One must seek the most advanced culture of the New World for that purpose. Maya temples and Maya sculpture can be compared with the products of Praxiteles, but that is not the whole story. Only a complete elucidation of Maya hieroglyphic texts and early colonial transcriptions will reveal the breadth of Maya life. The intellectual progress, the poetry, the philosophy of life, and, indeed, the whole spiritual achievement of the Maya, are contained therein, and these alone are worthy of comparison with the products of the minds of Pythagoras and Plato, Pindar and Aristotle. To chart the diverging and converging paths that lead independently to the cultural peaks must be the final aim of history."

With his eyes on the stars, the author has nevertheless done his full share of exploration and excavation in the tropical forests which once were home to the classical Maya and are now all but deserted. Thus he understands the potentialities and limitations of dirt archaeology because he has practiced it, and he has dealt with its yield of material objects as a museum man. With all this he has been, and is, the Americanist who knows most about the Maya inscriptions on stone, about the religion, and about the documentary sources; the one who has thought about them most broadly. In the *Introduction* he provides historical perspective on progress in the field to date.

Sound knowledge on a considerable scale really begins with the work of Ernst Forstemann in the 1880's. The list of important names since then is long, but on the level of analysis and resultant new and basically important insight I think those of J. E. Teeple and of Thompson himself will stand out well above all others. He is the same person as the J. E. Thompson of his earliest publications. The present volume represents that part of Thompson's work through a quarter of a century which he himself regards as most significant. It has been anticipated as his *magnum opus* and justifies expectations.

It renders obsolete the 1915 *Introduction to the Study of the Maya Hieroglyphs* of the late S. G. Morley but is not, as was Morley's, a textbook suitable for mildly interested readers. There is some dependence on cited earlier works of the author, and there is evidence of a rigorous "boiling down" process everywhere; yet the full coverage of so much material required some 300 large double-column pages of text. This text is written as if for straight-through reading, but the general flow of thought has had to be interrupted at many points in order to marshal evidence for new interpretations and inferences of the author. The scattered positions of some of this basically important and new material makes the apparatus for ready reference and handbook use especially important, and this was planned for. There is a considerable amount of cross-referencing, there is extensive use of subheadings rather fully reflected in the Table of Contents, a bibliography of more than 550 titles, and a special *Hieroglyphic Glossary and Index* in addition to a general index. Unfortunately, in the final chapter where Thompson summarizes his own original contributions he does not systematically give page or figure references for one who wants to run things down, and sometimes the trail must be picked up by reading with only the Contents as a guide, when one of the indexes would have been expected to do the trick.

The new contributions are numerous, varied, and extremely important. I have no doubt that most of them will stand the test of time, except, perhaps, a number of those concerning which the author himself specifically

indicates doubt. But the process of digestion and criticism by others lies ahead. Though the book will be the great authority for a generation, and justly so, let us not regard it as a sacred text.

To gain a quick impression of the book — which is too long and meaty for full description here — by sampling the methods used and the style of presentation, I would suggest reading pages 66-73 on the 260-day period and the day *Imix*; pages 212-217 on Thompson's 819-day cycle and a 7-day one postulated to account for it; and pages 46-51 on "Maya Graphology." The first half of the *Introduction* provides a thumbnail account of Maya culture and history in Thompsonian terms which should be read by everyone interested in American high cultures.

Such outstanding students as Gates and Beyer considered the glyphs to be entirely ideographic, while Morley held that there is an admixture of rebus writing. Thompson takes the latter position, but his rebuses are not the same, and he gives real evidence for them. In an appendix he attacks — successfully, I think — the all-phonetic theory of the late B. L. Whorf, which for a time seemed to promise so much. It is clear that Thompson regards the glyphs as recording language more or less fully, including words that to me (no philosopher) represent abstract ideas. I am not sure whether he would say they pass the test for "true writing" proposed by R. C. E. Long — the recording of complete sentences; but he seems to concede that they may not record everything a priest would have spoken. He believes decipherment is complicated by the availability to the scribe of many words and hence many glyphic elements for recording substantially the same thing, and why this is plausible can be explained by a quotation from page 92: "The poetical character of the inscriptions is present not only in the origins and uses of individual glyphs, but also in the construction of sentences [sic]. I am now convinced that the glyphic texts are a form of antiphony in blank verse. The redundant glyphs which I once regarded as evidence that the Maya were tautologists are surely added to strengthen the melodic qualities of the verse."

The book is meant to stand on its own feet, and it is a pity that among the numerous and splendid illustrations we do not have a few views of complete monuments and of a wider range of codex tables. We are provided here with only glyphs, gods, and related details, and a few complete inscriptions or excerpts from them. Each figure consists of a page of numbered photographs or drawings. Certain of these pages ought to be issued separately with a skeleton text more in the Morley manner, for use of students and explorers who will never absorb a tenth of what is given here, but who nevertheless may wish to "decipher" a Maya monument in the limited calendric sense that has been customary.

Now, it is necessary to make specific and adverse criticism. Because Thompson is so great a Mayanist it is correspondingly important that one realize he has his blind spots, like even his great predecessors. In two instances faulty memory has tricked him into treating important ideas of others as his own. When he wrote page 131 he evidently thought he had discovered two gods where Schellhas saw only one. This distinction had been made by William Gates in his *Glyph Dictionary* of 1931 in a passage close to one which is cited with a nonlaudatory implication. Even that, I believe, is unjustified in itself.

In the appendix on *The Correlation Problem*, responding to evidence and analysis in *La Farge 1934*, which is mentioned, Thompson has belatedly abandoned the famous "Goodman-Thompson-Martinez" (or, a bit more realistically, the "Goodman-Thompson") correlation of Maya and European chronologies, which has been represented by the "correlation constant" 584,285. He now shifts two days, to 584,283. This step was taken in a 1936 paper by R. P. C. Schulz, in which its basically important implications were explored rather fully and useful new tables were constructed. The Schulz paper appears in the bibliography but is not cited in connection with the discussion of the correlation question. Our author had forgotten it or he would not refer on page 98 to "the amended Goodman-Thompson correlation." In equal degree it is an "amended Goodman-Martinez correlation."

Let us get a few things straight concerning variant "Goodman" correlations of the "Eleven-sixteen" family. What Goodman, and later Martinez, advocated corresponds to the constant 584,281; what Thompson has proposed until now is the constant 584,285; Beyer has used 584,284 in an elapsed-time context; Schulz has advocated 584,283 in (I am reasonably sure) a current-time context. The "Schulz" and "Beyer" constants impose identical conditions for testing against astronomy unless there has been some disturbance in the time of day at the beginnings of ancient and modern *tzolkin* days, if the latter begin at sunset as reported. Though proposed in response to different bodies of evidence, they reflect differences in style of recording, not of substance. I think the time has come to stop trying to immortalize the names of scholars who have contributed to correlation theories of this group by using their names as labels. There are too many of them, and there will be more.

Despite occasional lapses, Thompson has tried to assign credit where due, and to notify the reader of sources with which he disagrees. However, under this latter head (and at some risk of showing bad taste) I call attention to a paper of my own, under 1947 in the bibliography. It includes some criticism of Thompson's "computing year" interpretation of the 364-day period of three tables in the Dresden Codex, and also some criticism of Teeple's "Determinant Theory," which develops a basic concept going back to Bowditch. I mention my paper because Thompson does not do so in these connections and because I still believe "computing" for the orthodox "ritual" year of 364 days is significantly misleading and groundless, and because also I

still believe that no single "determinant" has been established. As to the latter, few readers of the book here reviewed would suspect there can be any doubt.

I believe that Teeple and Thompson, like others before them, see astronomy where there is only chance relationship. Where Thompson thinks he strengthens the theory by seeing parallel significances in supposed "determinant" texts I think he weakens it by providing an alternative possibility. There has been much loose talk about the "great accuracy" of the Maya astronomers, so I will add that Thompson seems to agree with my not-cited conclusion that we ought to discard Teeple's determinant formula yielding the often cited value of 365.2420 as the length of the tropical year as calculated by the Maya at Copan (page 319).

The book is so exhaustive that I wondered at the subtitle "Introduction." Inquiring, I find that Thompson is at work on a glyph dictionary which, unlike that of Gates, will cover inscriptions on stone. In prospect after the dictionary is an all-out attempt to translate the texts of the codices. What we have in the present volume develops a sound method for putting flesh on the calendric skeleton of the Maya texts, and so brings what has seemed like a pipe dream into the realm of reasonable expectation.

LINTON SATTERTHWAITE
University Museum
University of Pennsylvania
Philadelphia, Pa.

Archaeology of Southern Veraguas, Panama. SAMUEL KIRKLAND LOTHROP, with appendices by W. C. ROOT, ELEANOR B. ADAMS AND DORIS STONE. Memoirs of the Peabody Museum of Archaeology and Ethnology, Vol. IX, No. 3, Cambridge, Mass., 1950. 116 pp., 150 figures, 10 tables.

Panama illustrates very nicely the dangers of historical deduction from scanty archaeological and ethnographic data, but, thanks to Linne, Stirling, Willey, and particularly to Lothrop, the geographical and chronological gaps in the archaeological record in the Isthmus are beginning to be closed.

One of the major gaps, from an exploratory point of view, was, until recently that part of the Pacific slope of Panama between the old cultural provinces of Cocle and Chiriqui. This is southern Veraguas, a topographically broken, tropical district lying south of the continental divide and including the western portion of the Asuero Peninsula. The region was so little known archaeologically that it was not realized, until Lothrop pointed it out in this report, that most, if not all of the gold objects found in Chiriqui graves were actually made in Veraguas.

There are still gaps in our knowledge, for Lothrop's analysis of Veraguas archaeology is based chiefly on material excavated by *huaqueros*. The collections, chiefly at the Peabody, but in many other museums as well, are, however, fairly well documented as to district and even to cemetery. Lothrop was able to open several graves himself. All told, the materials are adequate for a well rounded presentation of the ceramics, stone and metal of the region, and for the analysis of the trade relations of this apparently rather independent province.

The culture represented by the Veraguas graves is not very old, since it is demonstrably contemporaneous with that of Cocle, and some of the graves produced sixteenth century iron objects.

The report is in the best Lothrop tradition of careful description, excellent photographic and line-cut illustration and thoughtful discussion. It begins with an account of the Indians at the time of the Conquest, largely drawn, however, from the north coast, but probably applicable to the province in general. Appendix II, by Eleanor B. Adams and Doris Stone, is a translation of a seventeenth century account of the Guaymi, whose forebears may have been responsible for some of the archaeological remains in Veraguas.

The oustanding feature of the material culture is cast gold work. Lothrop states flatly that the Veraguans "were the greatest exporters of manufactured gold ornaments in the New World." There is relatively little high carat gold, most of which is disposed of commercially by the *huaqueros*. The bulk of Veraguas metal work is in the form of pendants of tumbaga, cast by the *cire perdue* process and gilded by the *mise en couleur* method. Such pieces are stylistically characteristic of the province, and represent eagles, jaguars, crocodiles, frogs, human figures and what seem to be gods — anthropomorphised forms of birds, jaguars and crocodiles. Appendix I, by W. C. Root, presents analyses of a number of these objects. Only a very few other types of objects have been found, in contrast to the variety of Cocle work.

The local pottery is entirely unpainted, often with women, monkeys, armadillos, jaguars, crocodiles, birds or frogs as applied relief decoration. Trade wares, chiefly from Cocle, are easily recognizable in this rather drab context.

Many of the specialized objects found in quantity in the Cocle graves are apparently absent in Veraguas. There are, for example, no stone bar pendants, no agate, serpentine or ivory carvings of local manufacture, and no metal overlay on stone. In addition, several tools of the Cocle type are absent, at least in the collections available. The only elaboration of technique, in other than gold work, seems to have been the intricate carving of legged metates.

Veraguas materials come from deep shaft graves, quite different from the shallow graves of Cocle and the stone-walled graves of Chiriqui. This suggests to the author a possible Colombian origin for the Veraguans, although the point is not stressed.

To many readers the most interesting part of this report will be the concluding discussion, chiefly concerned with trade, both specifically and generally.

Gold was probably the principal export of Veraguas, except to Cocle, where it was understandably not highly prized. Veraguas gold is, as stated above, very usual in

Chiriqui, common in Costa Rica, and has been found as far away as Chichen Itza. It does not appear to have been sent in quantity to the east, but for lack of controlled excavation in lowland Colombia this may not be stated definitely. Some gold from the Sinu region of Colombia has been found in Veraguas, but from the evidence at hand it would seem that the Veraguans were concerned more with export to and import from the Cocleans, Chiriquians and Costa Ricans.

While Lothrop believes that what he terms the vagabond trade, conducted by wandering peddlers, has been going on for a long time in Central and South America, he sees the Veraguan export as an organized production and distribution. He makes a strong case for the importance of coastal voyages, as against land travel, in the conduct of Central American trade, at the same time pointing out that old accounts indicate that the Veraguans themselves probably stayed at home, leaving distribution of their products to traders from the north and west.

It is not clear what the Veraguans received in exchange for their gold, or what they gave the Cocleans for their goods; feathers, other perishable objects, and even slaves, are suggested.

In conclusion, Lothrop remarks that field archaeology has tended to reveal Panama as an area in which rather small groups with distinct local preferences in materials and styles seem to have taken refuge, and that evidence of migrations is still lacking. Since all but the latest discoveries by Stirling and Willey represent very late occupations this does not seem surprising, but, as the author says in his final sentence, "hopes of explaining inter-continental problems have been expanded but the work is far from terminated."

ALFRED KIDDER II
The University Museum
University of Pennsylvania
Philadelphia, Pa.

Excavations in Mesa Verde National Park, 1947-1948. DERIC O'BRYAN. Medallion Papers No. 39. Gila Pueblo, Globe, Arizona, June, 1950. viii + 144 pp., frontispiece, 50 plates, 26 figures.

After the long need for planned and directed research within the specific confines of Mesa Verde National Park in southwesternmost Colorado, Dr. O'Bryan's monograph is an especially valuable contribution to Southwestern archaeology. The initial chapters provide a general background. Chapter I presents the physical environment. Chapter II explains the terminology thereafter to be followed. Key sites in the Mesa Verde sequence from the late 400's to 1300 are equated in parallel columns in accordance with the Pecos, Roberts' and Gila Pueblo classifications, and these sites are located geographically on an accompanying map. Naturally, the Gila Pueblo system is the one to which O'Bryan gives first allegiance. Chapter III gives the history of exploration in the Park, lists published information, states where collections removed by early collectors are now to be found, and tells whence and how materials in the Park Museum were assembled. Chapter IV summarizes the light shed on Mesa Verde archaeology, and particularly upon ceramics and their sequence, by three ruin surveys: one in the La Plata district to the east and southeast by O'Bryan in 1935 (for Carnegie Institution of Washington); one in the Ackmen-Lowry region by Paul Martin and his colleagues of the Chicago (Field) Museum; and one on the Mesa Verde itself by Gila Pueblo. In characterizing the pottery wares of successive periods, O'Bryan draws heavily upon technological analyses by Anna O. Shepard of materials from the La Plata survey and from excavated sites in the same district. He allocates Shepard's period types to named wares and gives a chart showing the estimated life span of these wares.

The next four chapters clearly describe the four sites excavated and discuss their cultural and time relationships. Then follows a presentation of non-ceramic artifacts; a long consideration of associated pottery with technological observations by Shepard; a mention of foodstuffs and Conclusions. After these appear a series of appendices: A, Tree-ring dates for Mesa Verde Ruins; B, Sherd Counts from the Excavations; C, Modern Fauna and Identification of Prehistoric Faunal Remains; D, Selected List of Modern Flora; E, Fewkes' Unit Pueblo, Site 149. The bibliography is comprehensive.

Principal objectives of Gila Pueblo's research on Mesa Verde, in cooperation with the National Park Service, were to clarify where possible the basic problems presented by the archaeology of that particular district and to provide for the visiting public exhibits showing stages in architectural development between the early pit houses and the late cliff dwellings. The four sites excavated fall in the following chronological order, listed by Gila Pueblo survey numbers.

Site 145. Two shallow, more or less circular pit-houses, each with a good-sized antechamber at the south side, but with no accompanying above-ground structures. From one came a timber with cutting date at 572 A.D., and from the other several with outer rings at 664.

Site 102 had witnessed two occupations. Evidences of the earlier were three fairly deep rectangular pit-houses flanked on the northwest by a row of slab-outlined above-ground rooms. The two pit-houses completely cleared contained timbers with cutting dates in the 830's. The later occupation was represented by an earth-walled kiva with masonry pilasters, but no southern recess, lying south of an above-ground house of two rooms, end to end, the walls of crude masonry. Incomplete timber sections from the kiva indicated a date of not long after 947.

Site 1, like Site 102, had been twice occupied. A row of slab rooms containing timbers with bark dates none later than 845, ran partially beneath a tiny D-shaped above-ground structure with disproportionately thick

masonry-faced, rubble-filled walls. The kiva associated with this peculiar edifice was faced to bench height with masonry and had masonry pilasters, but no southern recess. Cutting dates of timbers from it are 1004 and 1005.

Site 34, selected because of its relative lateness, was a good-sized masonry pueblo that grew by stages to a final content of 45 rooms, 5 kivas, fully walled and each with a deep southern recess, a tower and large refuse mound. Cutting dates of timbers secured were: Room 28, 1100; Kiva I, 1180; Kiva IV, 1160; Kiva V, 1163. O'Bryan believes ". . . . the pueblo to have been occupied continuously from about 1025 to the end of the 1100's."

Sites 145 and 34 were backfilled after excavation. The other two have been roofed over with shelters and stabilized by the National Park Service to rank as representative of the periods Pueblo I and Pueblo II among the permanent architectural exhibits of the park. Thus are provided piers, at least, for the bridge between the Basketmaker III structures, called earth lodges A and B, and the Pueblo III cliff dwellings.

On the basis of tree-ring dates, O'Bryan adds two phases, the *Four Corners* (Basketmaker III) and *Chapin Mesa* (Pueblo I, about 700-900 A.D.) to the Gila Pueblo classification of culture stages on Mesa Verde, after which follow the Mancos Mesa phase (Pueblo II, 900-1050), the McElmo phase (early Pueblo III, 1050-1150), and the Montezuma phase (late Pueblo III, 1150-1300).

O'Bryan marshals all evidence to show that cultural development in the nuclear area of Mesa Verde parallels in every respect the sequence as worked out for adjoining regions. At the same time it presents clearly and directly the material aspects of the history of the aboriginal inhabitants of the area in a way that should make it a boon to the public. And in it the specialist will find plenty of solid substance. The treatment throughout is decidedly factual, and intentionally so because, according to the original plan, there was to have been a follow-up with a broad and interpretive treatise.

Of particular interest to this reviewer is the impressive list of tree-ring dates in Appendix A because it includes those arrived at by both the Douglass and the Gila Pueblo methods. Readings for a specific site by the two methods rarely coincide to the year. Presumably this is to be accounted for by the fact the readings were made from different specimens, few of which reached to the bark ring so that the plus element usually enters in. However, for those sites dated by the two methods there is the general correspondence to be expected if both are to be considered reliable, as I believe they are. I have seen more than most outsiders have of the development of and steps in the use of Mr. Gladwin's method, and I am convinced that timber dates reached by that method, *when properly used*, are wholly acceptable, so long as they live up to Mr. Gladwin's criterion of conforming to archaeological evidence, and this same criterion is equally applicable to the findings by the Douglass method.

The editing of this paper is not up to the usual Medallion standard. In many of the illustrations of artifacts and pottery, careless trimming of the individual photographs from which the plates were made up has left a muddy halo around the objects which confuses the outline. In Plate XVII, *b* is upside down and figures 10 and 13 are presented with the arrow for north pointing down instead of up. Such things are minor, but one mistake got by which is serious and should be called to the attention of anyone using the book. There is complete reversal in assigning the numbers of key sites listed in figure 2 to their geographical positions on the map, figure 3. The numbers in the circles representing Balcony House and Obelisk Cave are transposed; 14 should be 1 and 1 should be 14. Like confusion obtains throughout the list.

Carpings of this sort seem to be an expected part of a review, but here they are not intended to detract in the least from the warm welcome that should be accorded to *Excavations in Mesa Verde National Park*.

EARL H. MORRIS
Carnegie Institution
of Washington
Boulder, Colorado

BOOK NOTICES

Patterns and Ceremonials of the Indians of the Southwest. JOHN COLLIER. 94 pp. text; more than 100 lithographs and drawings by Ira Moskowitz. Dutton, New York, 1949. $15.00. First edition of 1475 numbered copies.

A handsome book, with admirable pictures accompanying an idealistic philosophical essay by the former Commissioner of Indian Affairs on the situation and significance of Southwestern Indians in the modern world.

Culture in Crisis: A Study of the Hopi Indians. LAURA THOMPSON. Harper & Brothers, New York, 1950. 221 pp., 24 photographs, 3 text figures, 10 chapter-heading sketches. $4.00.

With an introduction by John Collier and a chapter on Hopi language compiled from published papers of the late B. L. Whorf, this well-organized book reports on a coordinated social science "case study" of aspects of modern life in the Hopi pueblos; an action-research project, concerned primarily with immediate though long-range problems of administration; utilizing psychological testing of Hopi children and discussing historical, environmental, and sociological factors, with a good summary of the archaeology and history of the area, from an ecological approach.

Sun in the Sky. The Hopi Indians of the Arizona Mesa Lands. WALTER COLLINS O'KANE. University of Oklahoma Press, Norman 1950. xvii + 261 pp., illustrated. $4.00.

A readable and sympathetic account of Hopi life and behavior, slightly idealized, with accurate observation of activities, crafts and trade, and ceremonies, but only very slight treatment of social organization or of historic and continuing acculturation, though basically sound. Possibly unsatisfactory to the specialized professional, but extremely good for the general reader. Archaeological and historical background are brief and sketchy but rather well presented.

Manual for Beginners in Central Texas Archaeology. EDWARD B. JELKS. Austin, Texas, January 1951. 12 pp. Mimeographed.

This little leaflet, written by a member of The Smithsonian Institution (River Basin Surveys) staff in Texas in response to local inquiries and requests, is one of the best for amateurs and collectors, clearly and simply written. It is very properly designed to direct beginners and hobbyists into the proper channels rather than to discourage them or frighten them off, and it would be quite suitable for groups of youngsters who are seriously interested. Intended for people in a specific area, it would be usable and, with virtually no important changes, applicable anywhere.

Paiute Sorcery. BEATRICE BLYTH WHITING. Viking Fund Publications in Anthropology No. 15, New York 1950. Pp. 110. $1.50.

Dr. Whiting's monograph goes far beyond the primary factual topics — the theory of disease and of diagnosis and treatment, and the basic concept of supernatural power, among the Harney Valley Paiute of southeastern Oregon. It is of interest and significance to all students of man for its discussion of types of social control and the hypothesis that sorcery and coordinate social control (public opinion, and retaliation by the group; as against superordinate control, in which selected persons of higher authority settle disputes and administer punishment) regularly occur together.

Other sections of the book, of interest to archaeologists concerned with the region of the northern Great Basin, include the section on environment and history, and the appendix on material culture of the Harney Valley Paiute, which emphasizes the rather few differences from the Surprise Valley Paiute described by Isabel Kelly (UCPAAE 31:3, 67-210).

California Fish Spears and Harpoons. J. A. BENNYHOFF. Anthropological Records 9:5, University of California, Berkeley and Los Angeles, 1950. 43 pp. (295-338), 7 figs., 3 maps. 75 cents.

A brief yet detailed distributional study, this is primarily concerned with localization of types in space and time. About 600 specimens are classified into several types of fish spears, barbed and unbarbed, and harpoons. Distribution of each type by area is given; ethnographic and historical sources are extensively utilized. The section entitled "Analysis" correlates one type of fish spear with the Early horizon (Windmiller facies), and the others with the Middle horizon of Central California, superseded by the simple harpoon which entered with the Late horizon; then discusses types of sea-mammal harpoons in northwestern California and northward, bilaterally barbed harpoons presumably for stream fishing in central California, barbed types of simple harpoons in southern California, and the varieties of composite toggle harpoons used by historic Indians throughout most of northern and central California, as far south as the Mohave Desert region; the probable history of the diffusion of the several major types is worked out in some detail. This is not interesting reading, and not intended to be; it is a thorough systematic study of the kind the need of which for each category of implement has often been stated. Of immediate value primarily to localized specialists, this concise monograph provides the kind of basic data fundamental to broad-scale reconstruction of human history.

Trade and Trails in Aboriginal California. LAETITIA L. SAMPLE. University of California Archaeological Survey Report No. 8, Berkeley, 1950. 30 pp. 60 cents.

A documented map of major Indian routes in California, evidently a thorough and dependable piece of work, is accompanied by a very brief discussion of trails as such, and another three-page section on trade in general, in which historical and archaeological evidences of Southwestern-Californian trade are summarized. There is also a long list, tribe by tribe from north to south, of articles given and received in trade, a most valuable and important compilation.

Acculturation and Personality among the Wisconsin Chippewa. VICTOR BARNOUW. American Anthropological Association Memoir No. 72, 1950. 152 pp.

Sections of particular interest to anyone concerned with the history and culture of native North America are those on the contrast of the comparatively peaceful Chippewa relationship to the whites, and ready acceptance of white domination and acculturation, with the violent resistance of the Plains tribes (pp. 28-31, 62-76). With the atomistic and individualistic way of life of the woodland tribes in the Canadian-Great Lakes region, white domination and acculturation brought about no such rapid and powerful disruption of the social order as among the highly integrated and institutionalized peoples of the Northern Plains.

Preliminary Appraisal of the Swanson Site, 39 BR 16, South Dakota. WESLEY R. HURT, JR. W. H. Over Museum, University of South Dakota, 1950. 22 pp., 4 figs. Multilithed.

This is a preliminary report on the excavations which the W. H. Over Museum and the South Dakota Archaeological Commission carried on, in cooperation with the National Park Service, in the Fort Randall Reservoir, South Dakota, in 1950. The site is that of an earth-lodge village situated on a terrace overlooking the bottom lands on the left bank of the Missouri River near Chamberlain in Buffalo County.

Hurt describes the excavations, which revealed four of the fourteen or more houses, a fortification ditch, and other features. The structures are rectangular pit houses, averaging about 50 feet long by 30 feet wide, each with an antechamber, or entrance, at one end. The arrangements of the posts suggest dwellings with gabled roofs.

Artifacts of stone, bone, and pottery were found throughout the site; but a minimum of description is presented, pending completion of the laboratory analysis. One unique artifact is a bannerstone made of catlinite. The pottery shows relationships to many culture complexes, such as the Upper Republican aspect, the Over focus, and Middle Mandan.

Potsherds of the Sommers site, on the Missouri River south of Pierre, South Dakota, related in a certain extent to the Swanson site and other recent excavations, are discussed by Hurt, it may incidentally be noted, in the mimeographed *Museum News* of the W. H. Over Museum, University of South Dakota, Vol. 12, No. 4, March 1951.

CARLYLE S. SMITH
University of Kansas
Lawrence, Kansas

Racial prehistory in the Southwest and the Hawikuh Zunis. CARL C. SELTZER. Peabody Museum (Harvard) Papers XXIII-1, Cambridge, Mass., 1944. vii+37 pp., 15 tables. $0.75.

Hyperbrachycephaly as influenced by cultural conditioning. J. FRANKLIN EWING, S. J. Peabody Museum Papers XXIII-2, Cambridge, 1950. xi+99 pp., 10 illustrations. $3.75.

The Mountains of Giants, a racial and cultural study of the North Albanian Mountain Ghegs. C. S. COON. Peabody Museum Papers XXIII-3, Cambridge, 1950. viii+106 pp., 28 tables, 16 illustrations. $4.75.

It is not without relevance to New World archaeology to note that the mythical or artificial status of the planoccipital (actually, cradle-board deformed) Armenoid and Dinaric "racial types" has been recognized in the last few years (see also J. Franklin Ewing, S. J., "Occipital flattening as a racial diagnostic," *American Journal of Physical Anthropology* 5:235-6, June 1947; R. W. Ehrich and C. S. Coon, "Occipital flattening among the Dinarics," AJPA 6:181-6, June 1948). Evidently the immigrants of Boas' famous study ("Changes in the bodily form of descendants of immigrants," *American Anthropologist* 14:530-62, 1912) probably became longer-headed simply because of cradling practices.

The change in skull type between Basketmakers and Pueblos in the eighth century in the Southwest has been (conversely) explained, as due not to any sizeable immigration but merely to the introduction of the hard cradle-board. Seltzer's preliminary announcement of this idea appeared fifteen years ago: ("New light on the racial history of the Southwest area," AJPA 21-2, 1936). The theory is expounded more fully in the important 1944 monograph cited above, which has previously been reviewed, so far as I can discover, only in the *New Mexico Historical Review* (by Leslie Spier, in Vol. XX, No. 1, January 1945). The revolutionary conclusion presented by Seltzer has been discussed a few times and seems to have been fairly generally accepted or supported (cf. T. D. Stewart, "Appendix B, Skeletal Remains," pp. 133-66, in F. H. H. Roberts, Jr., *Archaeological Remains in the Whitewater District, Eastern Arizona, Part II: Artifacts and Burials*, BAE Bulletin 126, 1940; chapter on "The 'Pueblo Invasion,'" pp. 67-73, in

J. O. Brew, *Archaeology of Alkali Ridge, southeastern Utah*, Peabody Museum (Harvard), Papers XXI, Cambridge, 1946). The undoubted continuity of cultural development in the Southwest (cf. pp. 43-5, E. H. Morris, *Archaeological studies in the La Plata district*, Carnegie Institution of Washington Publication 519, 1939) is thus paralleled and explained by continuity of physical type and population.

The idea of the "Basket Makers" becoming Pueblos by starting to use a hard cradle-board, on which the baby is tightly bound, is strengthened, and the mechanics of the process clarified, by the recent findings with reference to "Dinaric" Albanians and "Armenoid" Lebanese.

Father Ewing, after a thorough discussion of his Lebanese Maronites and their American-born offspring, as an "experiment," offers the startling further conclusion, based on a rapid survey of available data, that hyperbrachycephaly appears to correlate with cradle-board flattening and deliberate artificial deformation the world over. How well this will go over with physical anthropologists and prehistorians generally may be imagined: minor weaknesses and the inadequacy of the information on the subject will be pointed out kindly (or indignantly), instead of recognition of the importance of the general idea. Like so many bold and sweeping concepts, it probably is essentially or largely true, but not quite so all-inclusive as Dr. Ewing suggests, and the case may be weakened by overstatement. The actual facts of human racial history are tremendously complex, and probably the truth lies in a combination of other hypotheses, or portions thereof (see, e.g., Franz Weidenreich, "The brachycephalization of recent mankind," *Southwestern Journal of Anthropology* 1:1-54, No. 1, spring 1945), with at least a large portion of this one ably presented by Father Ewing.

Erik K. Reed
National Park Service
Santa Fe, New Mexico

El Peru Prehispanico, Vol. I. Hans Horkheimer. 291 pp., 75 figures, Lima, Librería Internacional del Perú (distributors); Editorial Cultura Antártica (publishers). 1950. $6.00 (Soles 60.00).

This is a manual on prehistoric Peru, based (at least in volume 1) on archaeology rather than documented history. It is meant first of all for university students in Latin-America, next for high-school teachers and educated *aficionados*, last for the professional archaeologist. It does not aim at literary grace, but packs as much information as it can, including maps, diagrams, and tables, into its nearly 300 pages.

It will be a convenient reference work for those in the United States who can read Spanish, because it outlines many of the more general background facts which our specialists in Peruvian archaeology are likely to take for granted and not mention in their monographs and articles. Thus, pages 30-46 consist of an account and appraisal of the 35 principal pre-1700 authors on native Peru; pages 51-70, of 83 19th and 20th century writers.

Chapter VIII reviews, very fairly, the principal reconstructions of stages of Peruvian culture, with the findings of Uhle, Tello, and Bennett tabulated, and on page 247 the views of Uhle (1920 and 1935), Kroeber, Nordenskiold, and Lothrop as to cultural interrelations of ancient Peru and Mesoamerica are diagrammed. Even Markham's Megalithic era is given notice (p. 249), while chronological problems concerning Chavin get 3 pages; Tiahuanaco, 8 pages. A general characterization of ancient Peruvian culture concludes the volume as Chapter IX. The virtue of the work is in its being broad, not too technical, and yet essentially accurate.

A second volume is planned to carry out the cultural description both topically and according to the principal pre-Incaic and Incaic monuments.

A. L. Kroeber
Columbia University
New York City

NOTES AND NEWS

FIG. 38. NOTES AND NEWS materials are segregated into sections in conformity with the areas outlined above.

GENERAL

Again there is great emphasis, in most areas, on the River Basin archaeological salvage program of the National Park Service and cooperating institutions, as will be seen in almost every section below. In addition to the urgent work of survey and salvage in reservoirs already under construction or with construction imminent, Charlie R. Steen of the National Park Service has been carrying on a general comprehensive survey of the archaeological resources of the Arkansas, White, and Red River basins, and A. H. Schroeder of the National Park Service has made a reconnaissance of the lower Colorado and lower Gila.

The major part of the actual reservoir surveys and salvage excavations is being carried on by the River Basin Surveys organization of the Smithsonian Institution, directed by Dr. F. H. H. Roberts, Jr. This nationwide program is extensively supplemented by work of state and local museums and universities, largely under memorandum of agreement (research contract) direct with the National Park Service. It is earnestly hoped that funds will be provided by congress for continuation of this work in the fiscal year beginning July 1; at the present writing, in May, the appropriation for this entire program has been cut out, but there is hope that it may be restored by the Senate. If it is not, the problem of trying to keep ahead of dam construction all over the country will be up to the state and local institutions without any material federal assistance.

Interest in preservation and exhibition of sites and monuments not threatened with imminent destruction is also noted. An example is seen in the Natchez Trace Parkway work summarized below under SOUTHEAST. Yet another example of preservation is found in the investigations recorded in the HISTORIC SITES section. A comparable subject, of preservation of historic monuments and art objects in Eufope which have been damaged or threatened by war and by other developments of modern civilization has been receiving attention there, even in the face of new further threats. These problems form the subject of international concern through UNESCO and of new journals such as the *Oesterreichische Zeitschrift fuer Denkmalpflege*, Vienna, 1947 onward.

In the development of the really basic activity of training professional anthropologists and of spreading some knowledge of human history among other students, examples of progress range from the initiation of new departments and courses and museums, to expansion of established departments. Of the first, the Southern Illinois University (Carbondale, Ill.) is a good example. Here Dr. J. Charles Kelley has been teaching two courses each term and, with the help of Bill Shackelford as preparator, is organizing an anthropological museum, as well as an academic department and a program of field work. Exemplifying the continued growth of the well-established departments, the University of Michigan has since its beginning in 1928 increased to a faculty of eleven giving a total of forty-eight courses. These cover general anthropology, ethnology (in a broad sense, ranging from acculturation through Far Eastern ceramics to North American ethnobotany), archaeology, physical anthropology (Dr. Frederick Thieme having been added to the staff in 1950), and linguistics.

A pioneer course on modern Latin American society is being offered by Professor Ralph Beals at the University of California in Los Angeles. Long a student of Mexican ethnography and social anthropology, Professor Beals recently made an extended tour of South America and a study in Ecuador. His course not only develops a new and much needed area of investigation, but also represents a further effort in the integration between anthropology and sociology. The problems in interdisciplinary work were also the subject of Professor Beals' presidential address before the American Anthropological Association in Berkeley last December.

EARLY MAN

In the field of EARLY MAN, a find of presumably ancient skeletal remains was made in late spring in New Mexico. The discovery of a fossilized human mandible at a depth of 6½ feet in gravel, turned up by a dragline operator on a construction excavation in Albuquerque, was reported by the press and radio on May 20. No cultural materials are directly associated with the specimen, but Dr. Paul Reiter considers that it probably represents the Cochise group whose stonework has recently been recognized and investigated in the Albuquerque vicinity. The jawbone, mineralized and with teeth unworn though adult, is presumably several thouand years old. Another item from southern California, not hitherto reported under that area, is that Dr. Thomas E. Clements, USC geologist, in archaeological and geological investigations in Death Valley has found evidence

of an extremely simple chipped stone complex on a terrace 400 feet above the present valley floor, representing an ancient lake which is tentatively correlated with the Tioga stage. An abstract has been published in the GSA bulletin. A point of interest is the lack of obsidian, as in very early lithic complexes generally, contrasting with the other, later sites in Death Valley and vicinity, in which obsidian is abundant. Other current progress in the EARLY MAN department includes 2 projects of the University of California at Los Angeles reported below under CALIFORNIA.

A possibly early site recently examined near Port Arthur, Lake Nipigon, Ontario, is reported by Richard S. MacNeish of the National Museum of Canada as yielding points resembling the Plainview type and other stonework of early appearance, but of unconfirmed date, associated with an old beach-line of uncertain age.

Still further to the north, the particularly interesting and important subject of early man in Alaska has been reported on in newspapers during the past several months, and in the ARCTIC section of this department (below and in the January 1951 issue), and has been summarized in part by our Assistant Editor for that area in a recent paper on the Cape Denbigh flint complex: "Early man on the Bering Sea coast," J. L. Giddings, Jr. (*Annals of the New York Academy of Sciences*, Series II, Vol. 13, no. 1, pp. 18-21, November 1950).

In the summer of 1949, excavations of the Texas Memorial Museum at the Clovis site in New Mexico revealed several crudely pointed and beveled bone tools. These were found at different depths within the lowest cultural stratum, which also contained numerous remains of elephants and, near its top, two Clovis Fluted points. Recently, the Assistant Editor for early man has re-examined other occurrences of bone and ivory implements found in proved or probable association with extinct Pleistocene fauna. Thus, the controversial bones found with a rich Pleistocene fauna in Potter Creek cave, California, in 1904, include eight or ten beveled bones and tubes, but were not accompanied by stone artifacts of any kind. Crudely pointed and beveled bone splinters, and one stone scraper, have been recovered from the very rich late Pleistocene fossil bed at Tequixquiac in central Mexico. Other bone tools and beveled pins or "harpoon points" have been reported from Oregon, Nevada, New Mexico, Manitoba, Florida, etc., in circumstances suggesting some part of the Wisconsin glacial age. Hence, an ancient and widespread "bone industry" may be emerging, but its relation to the earliest stone artifacts of America is not at all clear.

Finally, general aspects of early man in North America are taken up in Krieger's review in this issue of Kenneth MacGowan's book on the subject. The review by W. D. Strong in the *American Anthropologist* (Vol. 53, No. 2, April-June, 1951), incidentally, is less sharply critical of MacGowan's handling of the question of physical types of early immigrants than the two other reviews cited in the footnote added to Krieger's review.

HISTORIC SITES

At the other end of the North American time-scale, there has been in recent years an increasing amount of excavation of historic sites, using archaeological techniques, to obtain information supplementing and often clarifying or correcting the documentary sources, and in most cases also to secure historical specimens or to prepare remnants of structures for exhibit in place. The most striking recent work, undoubtedly, is William S. Godfrey's investigation of the Newport Tower in 1948 and 1949, demonstrating it to be a seventeenth-century colonial structure (presumably the "stone-built windmill" of Gov. Benedict Arnold of Rhode Island, about 1675) and not Viking or Norse at all (reported in *Archaeology* 2-3, Autumn 1949, and 3-2, Summer 1950; see also "The Newport Tower: a reply to Mr. Pohl," William S. Godfrey, Jr., *Archaeology* 4-1, Spring 1951).

Several of the Spanish missions of the seventeenth and eighteenth centuries in California, the Southwest, and Texas were at least partially excavated, and in most cases partially restored, before the war. The most notable such project, better executed than most and adequately published, is Franciscan Awatovi (report by J. O. Brew and others, to be reviewed in an early issue of *American Antiquity*, the January 1951 issue of the *American Anthropologist*, and the July 1951 issue of the *American Journal of Archaeology*).

In another former Spanish domain, Florida, considerable investigation of historic sites has been carried on within the present state of Florida, largely by the Florida Park Service, both for archaeological purposes of dating late aboriginal horizons and studying acculturative effects (Hale G. Smith, "Two historical archaeological periods in Florida," *American Antiquity* 13:313-9, No. 4, Part 1, April 1948; John W. Griffin, "An authentic glass artifact," *American Antiquity* 14:57-8, No. 1, July 1949), and as historical studies. Excavations in two seventeenth-century missions, San Francisco de Oconee (by Smith) and San Luis (by Griffin) have lately been published together with documentary historical material: Mark F. Boyd, Hale G. Smith, and John W. Griffin, *Here They Once Stood: The Tragic End of the Apalachee Missions*, University of Florida Press, Gainesville, 1951.

Returning to the western United States, there have been five recent and current digs in Spanish sites in the greater Southwest since last fall. Two were under way during the winter — that at Santa Cruz de Quiburi, Arizona, mentioned under SOUTHWEST in the last issue and below, being as much an archaeological problem as an historical one; continuing through the spring; and that in the Falcon Dam area on the lower Rio Grande in Starr county, Texas, under the supervision of R. L. Stephenson of the Smithsonian Institution (River Basin Surveys), involving salvage excavations at two stone buildings representing Spanish settlement in, presumably, the 18th century. There are two minor jobs by the National Park Service this spring. One consists of salvage excavations at Tumacacori National Monument,

Arizona, in the area between the mission church of San Jose de Tumacacori and the adjoining highway, reconstruction of which involves extending the right-of-way onto the monument. Only fragmentary materials and no important structural remains had been found in early May. The other has been a series of unexpected finds in connection with cleanup and stabilization work at Gran Quivira National Monument, New Mexico, by R. G. Vivian, of the National Park Service.

In addition to completing the repair and stabilization of the main mission of San Buenaventura de Las Humanas at "Gran Quivira," and clearing a portion of the Indian pueblo of Las Humanas—in a late house-block contemporaneous with the seventeenth-century mission —Mr. Vivian cleaned up the interior of the smaller, older mission church there, filling in the deep shaft dug long ago by misguided and misinformed treasure-hunters, and since furnishing a pleasant haven for innumerable rattlesnakes. In doing this work, Mr. Vivian found remnants of several features within the church, including a side-altar surviving fairly well, and traces of mural painted decoration on interior plaster.

The fifth recent project in the former interior provinces of New Spain was concerned essentially with a French site, though recovering primarily remains of the subsequent Spanish occupation of the same location. In the late fall of 1950, Glen L. Evans of the Texas Memorial Museum, Austin, explored the almost unquestionable site, on the Garcitas River in Victoria county, Texas, of Fort Saint-Louis — the landing place and temporary French settlement of Robert de la Salle on the Texas coast in 1685 and the first location (in the 1720s) of the Spanish presidio and Franciscan mission of La Bahia del Espiritu Santo de Zuñiga. The site was originally identified by H. E. Bolton in 1914. Extensive trenching by Mr. Evans in October-December yielded quantities of fragments of European and glass ceramics (and a few sherds of Chinese porcelain), native (local Gulf Coast Indian) pottery and stonework, metal fragments, bones of domestic livestock as well as bison, but only traces of floors. Most of the artifactual material is evidently referable to the Spanish occupation, but Mr. Evans hopes to separate out the French component in the current study of the materials.

Of even earlier date than LaSalle's unsuccessful colony on the Gulf Coast of Texas is the site of the first French settlement in the colony of New France, located on St. Croix Island, Maine, and included in the St. Croix Island National Monument (Project). This French settlement, under the command of the Sieur de Monts, was established in 1604, but was abandoned a year later. Champlain, a member of the colony, made some excellent drawings of the settlement, but whether it was on St. Croix Island has been in doubt since the issue was raised in settling the International Boundary more than 150 years ago. Preliminary excavations by the National Park Service, under the direction of Wendell Hadlock, were carried on in 1950. In addition to confirming the site as that of the De Monts settlement, much cultural material of the period was found, stone building foundations were uncovered, and what is believed to be the site of the cemetery, where 35 Frenchmen were buried during the severe first winter, was located. Excavation of the site should provide, in addition to important historical information, valuable data for physical anthropologists. (For information on this project and several others mentioned below, we are indebted to J. C. Harrington of the National Park Service.)

Interesting work at French sites in Canada has been carried on by Kenneth E. Kidd of the Royal Ontario Museum of Archaeology, notably at a significant 17th-century Jesuit mission — see Kidd, *The Excavations of Ste. Marie I*, University of Toronto Press, 1949 (reviewed in the July 1950, issue of *American Antiquity*, Vol. XVI, No. 1), and Kidd, "The identification of French mission sites in the Huron country: a study in procedure," *Ontario History*, Vol. XLI, No. 2, 1949.

The investigation of Anglo-American sites and material remains, as one phase of the study of our own history, has perhaps received less attention, from historians themselves as well as from archaeologists. Especially since the war, however, work of this nature, largely by the National Park Service (particularly Dr. V. A. Neasham on the West Coast and J. C. Harrington on the Atlantic seaboard) has developed rapidly.

The longest continuing project is that directed by Harrington at Jamestown, Virginia (in Colonial National Historical Park), beginning in 1934 with CCC labor and revealing foundations of about 100 seventeenth century buildings and various other features. The most recent job at Jamestown has been Harrington's excavation and study of the glass-works of 1608 and 1621 on Glass House Point, the oldest English attempt at glass-making in America.

An important contribution of the Jamestown project is the accumulating body of reference materials on seventeenth century English objects and specialized subjects. A great many specialized articles on Jamestown subjects have been published, as well as several general descriptions of the project, such as C. E. Hatch, *Jamestown, Virginia*, Washington, D.C., 1950. Unfortunately, most of the detailed reports on the Jamestown excavations have not been published, although they are available for use in manuscript form.

Investigation of remains of eighteenth century structures has been carried on at nearby Williamsburg, which in 1699 succeeded Jamestown as the capital of colonial Virginia, by Colonial Williamsburg, Incorporated, the outstanding project of its kind in the country, a privately supported enterprise.

Of outstanding interest is Harrington's discovery, excavation, and verification of the earthen fort constructed by the Raleigh colonists on Roanoke Island in 1585, now included in Fort Raleigh National Historic Site, North Carolina. Except for the stone fortification built by Drake on the coast of California in 1579, occupied for only a few weeks, this was the first structure built by Englishmen on the American continent (J. C. Harring-

ton, "Archaeological Explorations at Fort Raleigh National Historic Site," *The North Carolina Historical Review*, April, 1949).

Other excavations carried on by the National Park Service at Anglo-American sites include those at the settlement of Fort Frederica in Georgia, under the direction of Charles Fairbanks (C. H. Fairbanks, "Fort Frederica National Monument," *The Emory University Quarterly*, March, 1948); the Yorktown battlefield in Virginia and Saratoga battlefield in New York (many published articles and manuscript reports); and the late seventeenth century Creek Trading Post — the existence of which was *not* previously known from documentary sources — at Ocmulgee National Monument, Georgia (A. R. Kelly, "The Macon Trading Post, an Historical Foundling," *American Antiquity*, Vol. IV, No. 4, 1939).

Archaeological investigations of historic sites have not been confined to the Colonial period, as, for example, Preston Holder's excavation of the McLean House at Appomattox Court House, Virginia, from the results of which the house where General Lee surrendered to General Grant has recently been reconstructed. Another example of such work is that carried on before and since the war at Hopewell Village National Historic Site, Pennsylvania, where a nearly complete ironmaking community is being restored and developed as a folk museum (see Dennis C. Kurjack, *Hopewell Village*, Washington, D.C., 1950, for general description).

In addition to work by the National Park Service, other similar projects in the East include the extremely valuable work in the vicinity of Plymouth, Massachusetts, at various Pilgrim sites under the direction of Henry Hornblower, Jr. Results of these excavations will prove of special value, since some of the isolated plantation sites were occupied over relatively short periods, the exact dates of which are known.

In the Plains region and Texas, investigations of historic sites have been made in connection with the archaeological salvage (River Basin) program of the National Park Service and the Smithsonian Institution, at several early U.S. military posts and other frontier sites, mainly along the Missouri River. In 1950, a party headed by Thomas R. Garth investigated Fort Randall, Fort Lookout, Fort Whetstone, Fort Recovery, Fort Lower Brule, and Fort Hale; in 1951, excavation work in the Fort Randall Reservoir area, South Dakota, is being resumed and a project begun at Fort Berthold and Fort Stevenson in the Garrison Reservoir, North Dakota.

In 1950, also, R. L. Stephenson of the Smithsonian Institution made test excavations at Fort Graham while working in the Whitney Reservoir on the Brazos River, Texas.

For purposes of historical development, preservation, and interpretation, the National Park Service has conducted excavations and stabilization at Fort Laramie National Monument, Wyoming, before the war to a limited extent, in the CCC program, and resuming in 1950 under the supervision of Paul L. Beaubien. In 1936 similar excavations at Fort Ridgely, Minnesota, a frontier military post important in the 1800's, had been carried on for State Park purposes as a joint project, supervised by G. Hubert Smith, of the National Park Service, the Civilian Conservation Corps, and the State of Minnesota.

All the recent projects mentioned above were, of course, preceded by the extensive preservation work done by the North Dakota Historical Society. In North Dakota the forts in the long chain of garrisons along the Missouri have been set aside as state parks and varying degrees of restoration has been done.

A series of unusual projects along the Pacific Coast since 1946 by Dr. Neasham and archaeologists of the National Park Service (Louis R. Caywood and Thomas R. Garth), and by archaeologists of state and local organizations, especially Dr. R. F. Heizer of the University of California, since before the war, has revealed: (1) possible remains of Sir Francis Drake's landing on the California coast in 1579; (2) probable traces of the 1805-06 winter encampment of Lewis and Clark at Fort Clatsop, Oregon, near the mouth of the Columbia River; (3) the stockade at Spokane House, probably that built by the Pacific Fur Company in 1812; (4) remains of the 1818 and 1842 fur-trading establishments at Fort Walla Walla (salvage investigation prior to inundation by the McNary Reservoir); (5) building foundations and artifacts of the Hudson's Bay Company, dating from 1828 on, at Fort Vancouver National Monument, in Vancouver, Washington; (6) building foundations and artifacts of Marcus Whitman's mission, 1836-1847, at Waiilatpu, Oregon (Whitman Mission National Monument); (7) the original base of the flagstaff at Monterey, California, on which the United States flag was first officially raised in the Far West, on July 7, 1846, by Commodore Sloat, U.S.N.; (8) actual remains at Sutter's Mill at Coloma, California, site of the discovery on January 24, 1848, of gold in California.

Several of the interesting finds in California and additional possible projects have been summarized by Heizer in "Observations on historic sites and archaeology in California," (Papers on California Archaeology 6 in *University of California Archaeological Survey Reports*, No. 9, Berkeley, 1950), and published individually in part: Neasham and R. K. Beardsley on the Monterey flagpole in *California Historical Society Quarterly* (25:193-218, No. 3, September, 1946); report on findings at Sutter's Mill, "California Gold Discovery," (in *California Historical Society Quarterly* 26:107-62, No. 2, June, 1947). Certain of the historical digs in the Northwest also have been or are being published: L. R. Caywood, "Exploratory excavation of Fort Clatsop," (*Oregon Historical Quarterly* 49:205-10, No. 3, September, 1948); report by Caywood on excavations, Spokane House, to be published by the Eastern Washington His-

torical Society; report by Garth on excavations at Fort Walla Walla, to be published in the *Pacific Northwest Historical Quarterly*; Caywood, "The archaeological excavation of Fort Vancouver," (*Oregon Historical Quarterly* 49:98-116, No. 2, June, 1948); and T. R. Garth, "The archaeological excavation of Waiilatpu mission," (*Oregon Historical Quarterly* 49:117-36, No. 2, June, 1948); and "A report on the second season's excavations at Waiilatpu," (*Pacific Northwest Quarterly*, 49-4, 1949). Continued work on this line in the Pacific Northwest is mentioned below under current news from that area.

In connection with one of the most exciting projects—the problem and possibility of definitely locating Drake's landing-place—the finding of fragments of Ming-dynasty Chinese porcelain of the Wan Li period (1573-1619), and of a number of iron spokes in seven shell-mounds around Drake's Bay is of historical importance as well as of archaeological dating value and of interest with respect to trade and acculturation; although this material is ascribed by Heizer not to Drake but to the wreck here of Cermeno's ship the *San Agustin*, a Manila galleon, in November 1595: R. F. Heizer, *Archaeological evidence of Sebastian Rodriguez Cermeno's California visit in 1595* (California Historical Society, 1942); Clement W. Meighan, "Excavations in sixteenth century shell mounds at Drake's Bay, Marin County" (*Papers in California Archeology*, 9, Berkeley, 1950).

The major single item, of course, is the "Drake Plate," which was recovered in the same general vicinity (*Drake's Plate of Brass*, California Historical Society, Special Publication No. 13, 1937; C. G. Fink and E. P. Polushkin, *Drake's Plate of Brass Authenticated*, California Historical Society, Special Publication 14, 1938).

Most of the above might be regarded as not exactly archaeology, which in the New World could be defined, in one view, as the study, by whatever techniques, of the history and culture of the aboriginal non-literate peoples, after as well as before the first entrance at 1492, 1519, 1540, etc., of the European invaders who form the subject of study for historians in this hemisphere, through documentary and also other source-materials. Generally, field work in colonial archaeology is reported to historical societies and published in historical journals. Nevertheless, and even entirely aside from the frequent bearing it has on our own field in aboriginal history and acculturation, this work is considered of such interest as to call for this extensive summary in the journal of the Society for American Archaeology. Another view would, in any case, define archaeology as the investigation and study of all past cultures, or any reconstruction of history from material remains, whether "native" or colonial. The subject of "historic site archaeology," including both colonial archaeology and excavations for purposes of restoration, is well covered in a paper written in 1947 by J. C. Harrington which is now in press; see also A. R. Kelly, "The study of sites" (*Early Georgia*, Vol. I, No. 2, Fall 1950).

ARCTIC

In the plans thus far announced for field work in the Arctic during the 1951 season it is encouraging to see that attention is being given to the blank areas of the interior as well as to the periphery of the Arctic Sea.

Douglas Leechman is preparing a paper on his Yukon River field trips of 1946 and 1950. He hopes this year to spend two months in the British Columbia dry belt, an arid area between the Rocky Mountains and the coast range which has been little investigated. North of this area, R. S. MacNeish expects to re-visit the Northwest Territories and do some work along the eastern slope of the northern Rockies, roughly from Fort Good Hope north and west. His 1950 reconnaissance of this area gave evidence of several forms of culture, a seriation of which would offer a welcome yardstick for comparison with the Alaskan interior and the Kluane Lake region.

Another inland site, though environmentally quite distinct from those of the forests, is the Anaktuvuk Lake site discovered in 1950 by Wm. Irving, of the University of Alaska. This early site (related typologically to the Denbigh Flint Complex) is to be test-excavated by Irving under a grant from the Arctic Institute of North America.

James W. Van Stone will carry on excavations at Kotzebue, north of Seward Peninsula, for the University of Pennsylvania. The Old Kotzebue site of some 50 house pits, which is being destroyed by the encroachment of the present village, is expected to yield 14th century and earlier remains that should clarify problems of a western "Thule" culture. Van Stone will remain in Alaska as assistant professor in the anthropology department of the University.

Other plans of the University of Alaska include a tree-ring and archaeological survey, by Wendell Oswalt, of the section of east-central Alaska between the Tanana River and the bend of the Yukon, and a trip to St. Lawrence Island by Ivar Skarland, who hopes to secure material for radiocarbon dating from early deposits. Froelich Rainey announces that a radiocarbon laboratory will be set up this year at the University of Pennsylvania Museum, and that one of the first projects will concern arctic archaeological materials from all available early sites. The aim is to develop local sequences of dates to counteract the possible errors of limited sampling.

Some of the northern archaeologists are postponing their field work for a season in order to prepare their significant new finds for publication. Wm. S. Laughlin writes that he and his colleagues are working on some 4,000 specimens from recent Aleutian excavations. These represent some 3,000 years of deposition. During this period, harpoon heads are found to have changed form frequently, but without reference to general culture changes or distributions. Frederica de Laguna expects to put her manuscript on Chugach prehistory into final shape during the summer, and to do research at the University of Washington Library. In Denmark, Helge Larsen is at work on the early man material from the

Trail Creek Caves, assisted by Jörgen Meldgaard. J. L. Giddings has completed a report on three years work in the Kobuk River region, and is concentrating on "Eskimo" sequences at Cape Denbigh.

NORTHERN MISSISSIPPI VALLEY

Thorne Deuel of the Illinois State Museum on April 13th and 14th convened a group of thirty-one archaeologists at Springfield, Illinois. The conference was concerned primarily with Hopewellian pottery in Illinois but utilized the perspective obtained from the study of Hopewellian material in other areas. The objective was to clarify the nomenclature of the pottery types, both in reference to the minute divisions of the specialist and in developing broader categories of greater utility for general educational purposes. Discussion was initiated by the presentation of a series of types formulated by James B. Griffin.

Following the presentation of supplemental material by other participants, four pottery wares of the Hopewellian period in the Illinois region were named. Three of these wares, *Havana*, *Hopewell*, and *Weaver*, represent the characteristic Hopewellian pottery of central and northern Illinois, while *Jackson* ware is to be used to designate the Hopewellian pottery of southern Illinois which appears to constitute a distinct cultural province.

It is planned to publish a summary of the classification and a description of the wares this summer as a paper by James B. Griffin in a volume of the Scientific Papers of the Illinois State Museum.

A three-year program of intensive archaeological survey of the Upper Ohio Valley area has been initiated by the Carnegie Museum of Pittsburgh, with William J. Mayer-Oakes as the archaeologist in charge. The area includes western Pennsylvania and adjacent portions of West Virginia, Maryland, Ohio, and New York. Sites are being systematically recorded, and distributions of diagnostic types charted. The 1950 season was concentrated in the southern section, mainly in West Virginia; the 1951 work will be done in the north, clear up to Lake Erie, and the central area between is to be covered in 1952.

Illinois. The Illinois State Museum and the University of Chicago in 1951 will again conduct combined archaeological field operations in Southern Illinois for a period of eight to ten weeks. The first site to be explored is an Illinois village site, known historically to have been occupied by a Kaskaskia band from 1700 to 1832. Surface collections reveal aboriginal pottery, chipped flint points and knives mixed with iron knives, hatchets, gun parts, glass beads and brass kettles. The remainder of the field season will be devoted to a continuation of the exploration of the Hubele village location near Maunee in White County begun in 1950. Melvin L. Fowler will direct the excavation work. The report on the Ethel R. Wilson site (White County), as well as other Hopewellian sites, is being prepared for publication later this year.

John C. McGregor reports that in conformity to the broad plan of field work and student training at the University of Illinois, preparations are being made for a field party in archaeology to the Southwest this summer. The general plan is to work one season in Illinois, the next in the Southwest, thus giving students experience in the two fields. The material secured in Illinois last summer, while at work on Illinois River Hopewell, is gradually being written up for publication.

Missouri. The University of Missouri fifth summer field session in midwestern archaeology will be held primarily in the Table Rock Reservoir area on White River in southwestern Missouri, under the direction of Carl H. Chapman. This is the heart of the so-called Ozark Bluff Dweller territory and excavations will be conducted in at least three dry shelters believed to contain Bluff Dweller deposits. The last part of the session will be held in central Missouri where a Hopewell and an Oneota site will be investigated.

The excavations in the Table Rock Reservoir area will be a continuation of the past policy of using the field session to aid in the salvage of archaeological remains threatened with inundation by the backwaters of proposed flood-control dams.

NORTHERN PLAINS

Plans for the 1951 field season in the northern Plains indicate that the salvage of archaeological data from areas to be flooded will be pushed forward on a larger scale even than in 1950, when an unprecedented amount of work was done. The Smithsonian Institution River Basin Surveys under the direction of Paul Cooper will have several parties in the field. Excavations are planned in the Fort Randall and Oahe reservoirs in South Dakota and the Garrison Reservoir in North Dakota. The National Park Service has entered into cooperative agreements with the University of South Dakota, Nebraska State Historical Society, University of Nebraska, University of Kansas, Montana State University, North Dakota Historical Society, and University of Wyoming, for additional similar work (see GENERAL for problem of funds).

A cooperative project of the W. H. Over Museum and South Dakota Archeological Commission will excavate the Scalp Creek village and a nearby site on Ellis Creek, in the Fort Randall Reservoir, South Dakota, with Wesley R. Hurt as field supervisor. Previous excavation at Scalp Creek has shown that it is a double component village, with a Woodland component underlying a later circular earth lodge village. The site at Ellis Creek is a Woodland village. The final report on the Swanson site, excavated during the 1950 season, is now in press.

The Nebraska State Historical Society will have a small field party in the Fort Randall Reservoir, South Dakota, under the direction of Marvin Kivett. Excavations will be carried on in two or three sites near the mouth of the White River.

Field work by Kivett during the month of April included the excavation of a burial site in the Sand Hills, McPherson county, Nebraska. The remains of nine individuals were removed from the bottom of a blowout on the shore of a lake. Two to three individuals buried in a sitting position were removed from each burial pit. Associated stone artifacts include three boatstones, projectile points, scrapers, and knives. A similar burial site with individuals in a sitting position was excavated by Kivett in 1946 near Scottsbluff, Nebraska, for the Laboratory of Anthropology, University of Nebraska. Whether this burial complex is attributable to an early pottery-making group or to a "lithic" group is not known at this time.

John Champe of the University of Nebraska will return to the Harlan County Reservoir in Nebraska for the fourth season with a view toward sampling a number of small sites before they are inundated.

A field party under the direction of Carlyle S. Smith of the Museum of Natural History at the University of Kansas will return for a second season at the Talking Crow site in Fort Randall Reservoir, South Dakota. The analysis of almost 22,000 potsherds and over 1500 other specimens recovered from the same site last year has been completed.

Carling Malouf of Montana State University will excavate a site in the Garrison Reservoir, North Dakota. William Mulloy of the University of Wyoming will excavate in the Keyhole Reservoir in Wyoming. The North Dakota Historical Society has added James Howard to its staff, and plans further excavations at the site of Old Fort Berthold.

The University of Colorado Museum reports that Allan P. Olson has been working up Plains material collected by Lohr over a period of 15 years from 50 sites in the foothills region of Boulder and Larimer counties, Colorado. Plans are being made to excavate rock shelters in Boulder County to supplement Lohr's collection with chronological data. Herbert W. Dick of the Museum has finished a detailed survey of previous archaeological work in Colorado, with special reference to the Plains, in an effort to determine priority needs for establishment of cultural sequences.

Richard S. MacNeish of the National Museum of Canada is working, in late spring, on stratified sites in Manitoba; and, as a part of the same general coordinated program, Boyd Wettlaufer will be carrying on site surveys this summer in Manitoba and southern Saskatchewan.

PACIFIC NORTHWEST AND BASIN-PLATEAU

Charles E. Borden, University of British Columbia, is continuing excavation and surface collecting at Musqueam in the Fraser River delta. Nearly a thousand specimens have been recovered to date. Information from protohistoric and late prehistoric deposits reveals a culture quite distinct from that of other delta sites excavated; surface collections from two older habitation sites in the area suggest affinities with the Marpole-Point Grey component previously reported on. Borden has also received a grant from the Canadian Government to conduct an archaeological survey this summer in the Kitimat-Nechako region of British Columbia; this area is soon to be flooded by reservoirs to be created for the huge Alcan plant to be constructed at Kitimat.

The University of Washington, with contract funds from the National Park Service, will excavate in the McNary Reservoir of the Columbia River this summer, with Douglas Osborne in charge. Osborne will also conduct archaeological and ethnographic surveys of plateau areas in eastern Washington, probably starting in the fall.

The Washington State Parks and Monuments Board is sponsoring archaeological work at Old Man House, an Indian village site on Puget Sound,, and at Spokane House, a fort and trading post of the contact period near Spokane, by William Massey and John Mills, University of Washington, and Louis Caywood, National Park Service. Caywood is also continuing work this summer at Fort Vancouver on the Columbia River.

Luther S. Cressman, University of Oregon, plans a six-weeks field trip on the Klamath Indian Reservation to excavate house pits and associated middens which are thought to be intermediate in time between the end of the occupation of the large midden excavated in 1949 and the historic villages previously excavated. The analysis of materials from these sources shows a continuity of occupation of the area over a very long period of time, probably from the early post-Pluvial, and a development of tradition in certain kinds of artifacts. The 1951 work will be directed toward giving a more complete picture of the transition from the prehistoric to the historic forms of technology and economy.

Lloyd Collins, University of Oregon, will conduct an archaeological survey of the Oregon coast from the Columbia River south starting in June. This survey will lay the basis for an excavation program that will extend over several years. It is hoped that within five years this coastal work together with the University's work in south central Oregon and the River Basins projects will provide a reasonably satisfactory outline of the prehistory of Oregon.

Cressman has also made tentative arrangements with the Geochronometric Laboratory at Yale to run Carbon 14 tests on both wet and dry materials to validate the date for the Mt. Mazama pumice and thus check the disputed point of the relative values of wet and dry materials for Carbon 14 dating.

Sue Price, museum assistant, University of Utah, has completed the identification and catalog of textile materials in the museum; a descriptive and analytical paper on the Anasazi textiles is in preparation. The state-wide archaeological survey of the University of Utah has now been established as a full-time permanent activity, with Jack Rudy appointed as field director under Jesse Jennings' supervision.

CALIFORNIA

The University of California at Los Angeles and the Archaeological Survey Association of Southern California are jointly compiling a bibliography and site index of archaeology near Los Angeles. A further joint project is the reexamination, by graduate students under the direction of George W. Brainerd, of the evidence for the dating of the Lake Mohave culture; the distribution of artifacts on old beach levels strongly suggests contemporaneity with the presence of permanent water in Lake Mohave's now dry basin.

The Southwest Museum and UCLA are collaborating this summer in further excavations at the Stahl site of the Pinto culture near Little Lake, California, under the direction of M. R. Harrington. The Stahl site has previously yielded the first house remains of the Pinto culture.

The fourth annual meeting of the Archaeological Survey Association of Southern California was held at the Southwestern Museum on March 5, 1951. New officers for the year include David Rice, president; Elizabeth Hagar, secretary-treasurer. This society of amateurs and professionals, sponsored jointly by the institutions in the area, has as its aim the accumulation of a systematic file of information on southern California archaeological sites.

A. E. Treganza, San Francisco State College, is continuing the excavation of Site Ala-328, a two-component site in the Bay area with Middle and Late Horizons represented. This summer, Treganza will be in charge of field work to be conducted in the Farmington and Monticella Reservoir areas by the University of California under contract with the National Park Service. The University of California Summer Session field class will excavate in the Carson Sink area of western Nevada and will then move to the Napa Valley in California to carry out general investigations. Martin Baumhoff is directing River Basin Survey (Smithsonian Institution) excavations in the Cachuma Reservoir, Santa Barbara County, California.

W. Wallace has resigned as archaeologist for the University of California Archaeological Survey, to accept a position as assistant professor at the University of Southern California. Clement W. Meighan replaces him. Recent activities of the Survey include an intensive survey of the northern part of Death Valley National Monument and the testing of a Borax lake type site in the Napa Valley, attributable to the Middle Central California horizon.

SOUTHWEST

The 1951 Pecos Conference will be held August 15, 16, and 17, at the University of Arizona archaeological field school camp at Point of Pines, Arizona, on the San Carlos Apache Reservation.

Arizona. The Museum of Northern Arizona and the University of Illinois are sponsoring a joint expedition for further study of the Cohonina culture of northwestern Arizona. Sites of Pueblo I-Pueblo II age near Mt. Floyd, between Ashfork and Seligman, will be excavated, by a crew of graduate students under the direction of John C. McGregor, June 20 to August 1.

The Yavapai County Archaeological Society plans to conduct excavations of three sites in the Groom Creek area, south of Prescott. Herman L. Womack will have general supervision of the work, and Hillis R. Crittenden will conduct an archaeological survey. Members of the Society will do all the work on a volunteer basis. In addition, field trips are planned into areas likely to offer opportunity for later survey and exploration. Harold S. Colton of Flagstaff is advisor to the Society.

Students in anthropology at Arizona State College at Tempe tested, under the direction of Kenneth M. Stewart, several Classic Hohokam sites in the vicinity of Tempe during the winter months. In August, Stewart and a number of students will continue the excavation of a site of Pueblo III age near Payson, Arizona, upon which work was begun in 1950.

The University of Arizona archaeological field school at Point of Pines, directed by E. W. Haury, will continue work on projects begun last year: further studies of a Mogollon pit house village of presumed early Christian era age, excavations in 10th and 11th century structures, and additional clearing of rooms dating approximately 1300 A.D. which appear to have been inhabited by an immigrant group of Pueblos from northern Arizona.

The Arizona State Museum has completed the move of Gila Pueblo collections from Globe to Tucson. All study collections are now available, and major revisions are being made in the Museum to accommodate synoptic displays based on the Gila Pueblo material. Persons desiring Medallion Papers may now obtain them through the Arizona State Museum.

The Amerind Foundation will continue excavations at Quiburi until the month of June, under the direction of Charles C. DiPeso. During subsequent summer months, DiPeso will make an archaeological survey of the upper San Pedro River valley, north of the international boundary, to check all sites that might possibly be obliterated by any future dam sites planned in the area.

In March, Albert H. Schroeder, National Park Service archaeologist at Lake Mead National Recreational Area, and Donald P. Jewell, completed an archaeological reconnaissance of two Bureau of Reclamation areas, from Davis Dam to the Mexican border, and the Wellton-Mohawk Canal project on the lower Gila. Fifty-one sites on the lower Colorado and 17 on the lower Gila were recorded, of which the majority were camp sites and the remainder petroglyphs, stone circles, gravel and boulder pictographs, shrines, rock shelters, trails, etc. Most of the material recovered from both areas is representative of the River Yuman culture described by Malcolm J. Rogers. Intrusive material from the Prescott branch of western Arizona was encountered near Parker; Hohokam intrusives were lacking throughout. A detailed report on the survey is being prepared.

The Laboratory of Tree-Ring Research at the University of Arizona will undertake two archaeological projects under the supervision of Terah L. Smiley during the coming year. First will be a complete review of all the tree-ring specimens from the Rio Grande Valley, based upon the Laboratory of Anthropology collection now at Tucson. Second will be a review of all specimens from the Chaco Canyon area and, where possible, correlation of dates with archaeological data. Mr. Smiley now offers a full year course in "Tree Ring Methods for Archaeologists" in the Department of Anthropology, to aid students in understanding what tree-ring dates really are and how they can have a sounder application to archaeological material.

Colorado. A coordinated program of investigations in the vicinity of Grand Junction, Colorado, is planned. The University of Colorado Field Session in Archaeological Research, under the direction of Robert H. Lister of the Department of Anthropology and Herbert Dick of the University Museum, will excavate caves containing early Basketmaker remains. The field session will be from June 15 to July 20. A separate party headed by H. Marie Wormington of the Denver Museum of Natural History will work elsewhere in the same general area.

New Mexico. W. C. Holden's archaeological field school from Texas Technological College will continue work at the Bonnell Ranch on Highway 70 in the Hondo Valley, fourteen miles east of Ruidoso, where excavation was begun last summer. The field session will be from July 14 to August 24.

The University of New Mexico will participate in three excavations during the summer. One project will continue work at a Chama Valley site begun last summer, in cooperation with the Museum of New Mexico and the National Park Service. Stanley Stubbs and Roscoe Wilmeth will be in charge of the work. A second project is the continuation of a deep cave excavation in Lincoln County, where Basketmaker material is found in the top few inches and other cultural remains below, the nature of which will be determined. Paul Reiter will direct 16 students and staff at this project. A third project, with the same staff, will involve the excavation of a small rock shelter south of Grants, New Mexico. In addition, it is expected that two small parties will be in the field doing both archaeology and ethnology. The field sessions will be from June 7 to July 20.

During the summer of 1950 the Southwest Archaeological Expedition of the Chicago Natural History Museum excavated Tularosa cave, a dry cave about 25 feet wide and 40 feet deep, near Aragon, in west central New Mexico. Ceramic and lithic artifacts revealed that the cave had been occupied from a pre-pottery period, which resembles Cochise (Chiricahua), through Pine Lawn, Georgetown, and San Francisco phases. During the Reserve-Tularosa period the cave was used for ceremonial purposes.

For the first time, perishable material was found in association with Mogollon and Cochise ceramic and lithic material. Bows, arrows, darts, atlatls, reed cigarettes, bahos, flutes, digging sticks, cradles, nets, mats, cloth, sandals, basketry, fur robes, string aprons, and great quantities of knotted fiber and cordage were recovered. In addition, two desiccated human bodies were found which will yield much information on Mogollon burial customs as well as physical type.

While the study of the collection is not yet complete, certain tentative conclusions have been reached. In the Mogollon area the atlatl seems to have preceded the bow and arrow. Mogollon Indians used the digging stick for planting corn; they wore sandals, string aprons, and fur robes; and their ceremonial ritual included use of corn bahos and miniature bows.

Textiles, including sandals, cloth, basketry, and matting, were the most numerous of the perishable artifacts. Basketry was predominately coiled, although some twilled fragments of ring baskets were found in the late period. Matting was either plaited, in under-two-over-two weave or under-three-over-three weave, or twined and sewed together. Cloth fragments are primarily plain over-one-under-one checkerboard weave, although one fragment of a twined bag was found. Cloth does not appear before San Francisco times.

About 200 sandals were found which can be divided into three major types: 1) wickerwork sandals, which occur earliest and last through the San Francisco occupation of the cave; 2) woven sandals resembling plain Basketmaker sandals which are in the minority and occur only in the Georgetown and San Francisco phases; and 3) plaited sandals which first appear in the Georgetown phase and continue through the Reserve-Tularosa occupation, where they are the only type found.

Tularosa cave yielded the best archaeological collection of plant and animal food yet reported. Evidence of beans, squash, pumpkins, gourds, walnuts, pinon nuts, cactus fruits, and sego-lily bulbs were found. However, the most important food found in the cave was corn. About 38,000 corn cobs and cob fragments, a few with kernels, came from the cave. Much of the corn is podded, and some, from the lowest levels of the cave, is the most primitive yet found. This material is being studied by Hugh C. Cutler.

Recent expansion of anthropological activities in Santa Fe includes the construction of a new building alongside the Laboratory of Anthropology for the International Museum of Folk Art, also a unit of the Museum of New Mexico; the addition of Fred Wendorf, archaeologist, and of Sally Lewis, to the staff of the Laboratory of Anthropology (Museum of New Mexico); and the addition of Sallie Pierce Brewer as an archaeologist in the Region Three office, National Park Service, with Charlie Steen and Erik Reed. Thomas B. Onstott of the same office is on active duty with the U.S. Army at Fort Bliss, Texas.

SOUTHERN PLAINS

River Basin Surveys in Texas under Robert L. Stephenson carried out the following projects in the first half of 1951: E. O. Miller and E. H. Moorman completed the survey of the Ferrell's Bridge Reservoir on Cypress Creek, in east Texas, locating some 30 sites of significance, 6 of which are artificial mounds. Miller and Moorman also conducted brief excavations in two sites in the Belton Reservoir on the Leon River. One, a rock shelter of the early historic period, may be a Comanche burial site. The other, an open site, produced an artifact complex similar to that found in the Whitney Reservoir rock shelters on the Brazos River. Donald B. Hartle excavated three sites in Falcon Reservoir on the Rio Grande, including two historic (Spanish colonial) house ruins. The third was a deeply buried site which produced 200 artifacts similar to those found in surface sites of the area, implying a long and continuous occupation in this area by a rather uniform culture complex. Robert H. Humphreys conducted a brief survey of the Granite Shoals Reservoir on the Colorado River, locating 12 sites. In the spring, E. B. Jelks continued excavations in the Lavon Reservoir on the East Fork of the Trinity River, begun by Robert L. Stephenson last year at the Hogge Bridge site, the type site of the Wylie focus, and moved to the Garza-Little Elm Reservoir in May.

SOUTHEAST

Eastern Oklahoma. The field school of the University of Oklahoma, directed by Robert E. Bell, will excavate at site OK-32 in the Tenkiller Reservoir on the Illinois River in eastern Oklahoma. During the months of April and May, Donald J. Lehmer of the Smithsonian River Basin Surveys conducted excavations at other sites within the Tenkiller Reservoir. Excavations by the University of Oklahoma are planned also at four sites in the Eufaula Reservoir this summer in cooperation with the National Park Service.

Current laboratory studies include preparation of reports upon excavations in Custer county, Oklahoma, analysis of the Brown site materials, and analysis of the Lf Ga I site which contains historic Choctaw materials. Karl Schmitt is preparing an article on historic Creek and Choctaw pottery vessels now in the Oklahoma Historical Society Museum. Bell and David Baerreis are assembling a summary report of available information on the archaeological horizons found in Oklahoma.

Arkansas. The Museum of the University of Arkansas is planning its second annual summer field session in archaeology to be held June 11 to August 3. Work will be centered on a 40-mile section of the lower Ouachita River near Camden. Survey work and excavation it is hoped will shed new light on the Caddo Indian and his prehistory.

Louisiana. Robert Fulton has submitted a report on the excavations of the Bellevue mound, mentioned previously, as his thesis at the University of New Mexico. It will be submitted for publication by Fulton and Clarence Webb after a comparative study of artifacts has been made by James Griffin and Alex Krieger. Prior indications that the site will be of importance in the early mound-building horizon of northwestern Louisiana are borne out by further study and the finding of two sherds of the Marksville period in the upper levels.

On April 22, Dr. and Mrs. Philip Phillips, James Ford, Warren Eames, William Haag and Clarence Webb made a brief reconnaissance of the Poverty Point site on Bayou Macon in northeastern Louisiana, to compare its constitution and cultural content with those of the Jaketown site near Belzoni, Miss. Haag had originally noted evidences of Poverty Point cultures at the Jaketown site and for the past two months, Ford, Phillips, and Eames have conducted excavations which corroborate Haag's findings.

A flake industry, consisting of numerous flake knives, drill-like objects, gravers and cores found at Jaketown had been established, at a previous conference of the group held at Belzoni, as being identical with objects of this type which we had found at Poverty Point. The Jaketown excavations and the survey at Poverty Point tend to confirm previous indications that mound-building in this horizon antedated pottery making, and possibly antedated also the use of stone vessels, which may have come in late in the period.

Limited examination of profiles exposed by erosion indicated that at least the upper portions of the big mound (Moore's mound A) at Poverty Point, its platform, and portions of the Motley mound 3 miles north of mound A, were artificial in construction. Dirt loads at mound A showed fragments of Poverty Point clay objects; at the Motley mound impressions of basketry were found. Present limited evidences indicate that mound A, 70 feet in height, was constructed during the Poverty Point period, before advent of pottery.

Warren Eames has written an excellent summary, entitled "A Culture-History of the Aboriginal Peoples of Louisiana" as his thesis for honors at the Department of Anthropology, Harvard University. It is particularly full in description of the cultures of the central and southern parts of the state, although regrettably brief in outline of the Caddoan sequences in the northern and northwestern portions.

Mississippi. Although faced with probable curtailment of funds next year, the National Park Service's archaeological survey of the Natchez Trace Parkway has carried out a portion of the projected archaeological salvage program initiated in July, 1947. This included excavation of the Bynum site in the Miller I and II horizon of northeastern Mississippi, stratigraphic tests at the Emerald (Selsertown) mound and Anna mound group sites in the Plaquemine-Natchez horizon of southern Mississippi, and extensive excavation of the Coles Creek type site, now known as the Gordon mound and Village site, on Coles Creek 25 miles north of Natchez, Mississippi, and completion of laboratory analysis. The final report by John L. Cotter on the Gordon site materials will be submitted before July 1, 1951, by which time

Cotter is to be transferred to the Washington, D.C., office of the National Park Service for the duration of John Corbett's tour of active duty in the U.S. Army.

Of the several limited test excavations carried out by the archaeological survey project along the Parkway, the most significant was at the Mangum cemetery site near Port Gibson, Mississippi, where data relevant to the cultural association of repoussé copper plates recovered from a burial there in 1941 was gathered in limited test excavation in April, 1951. Cotter is preparing a report on the plates and the association of the Southern Cult with the Mangum site. Information gathered will be used by the National Park Service in the interpretation to visitors of several important archaeological sites along the Parkway from Nashville to Natchez, with interpretive markers, information stations, and a central museum, exhibiting artifacts and explanatory materials.

William Haag, of the University of Mississippi, has been making a survey at the Grenada Reservoir project on the Yalobusha River in Mississippi, in cooperation with the National Park Service. It is an area where no previous archaeological investigations have been made. Thus far 17 sites, including 2 conical early mounds, 1 truncated pyramidal mound, and 14 village areas, have been located. A number of the sites located are worthy of excavation if funds can be obtained.

Georgia. Joseph R. Caldwell has just completed a four month survey of the Buford Reservoir area on the Chattahoochee River northeast of Atlanta, Georgia for the River Basin Surveys (Smithsonian Institution). A detailed report has not yet been prepared but 50 or more sites have been located, a large number of which apparently belong to a rather early prepottery period. Many more mounds than were previously thought to exist in that area were located. Two of them are particularly interesting in that they seem to be exceptionally early, according to A. R. Kelly. Caldwell will probably spend the remaining spring months working up his report on the survey.

Wm. H. Sears became assistant professor in January in the Department of Anthropology and Archaeology at the University of Georgia. He is engaged in preparing a report on field work at the Wilbanks site on the Etowah River and in teaching. The report of his first season of work at Kolomoki Mounds State Park was published by the University Press this winter; the second season's report concerned with the exploration of mound E is in press.

A. R. Kelly of the University of Georgia has carried out further survey of archaeological sites in the neighborhood of the two Eatonton stone effigy mounds. Excavations on one of the eagle sites failed to produce any definitive material that would bracket these structures in the existing chronology of middle Georgia. Kelly is completing work on the report on Swift Creek mound and Village site, to be ready for press in the spring. Antonio J. Waring, Jr., research associate, is preparing a report on the pre-Deptford phases of Georgia coastal archaeology.

The University of Georgia third session of summer field school in archaeology will be located this year at Corra Harris lodge near Cartersville, Georgia. The program calls for exploration of limestone caves which have yielded materials resembling the Copena culture, and a large village site of the Kellogg period (transitional from north Georgia prepottery to fabricmarked pottery sites). Students will also visit and study at the Tumlin (Etowah) mounds.

The National Park Service is continuing to strengthen its program at Ocmulgee National Monument. Gustavus Pope is now at the monument and Charles Fairbanks will soon move there to commence writing reports on the pre-war excavations. The installation of museum exhibits is progressing and completion is hoped by midsummer. In addition new storage facilities are being provided so the large collections will be readily available for study. This will result in the finest archaeological museum in the Southeast.

Florida. The University of Florida, in cooperation with the Everglades National Park, carried out its third between-semesters student field trip in the Park and the second in the Lostmans River area. Two new stratigraphic tests were carried below sea level. From the last two seasons work there are now three sites with Glades I material 36″, 36″, and 42″ respectively, below sea level. In no case was the limit of refuse reached. A student field party from the University spent the Easter weekend on Shired Island in Dixie county. A stratigraphic test yielded material from the Orange period through Santa Rosa–Swift Creek. Classical northwest Gulf Coast pottery types were present. Further work is planned here. In December and April stratigraphic tests were made at Rollestown in the St. Johns River yielding a five-foot sequence ranging from Mt. Taylor to St. Augustine times.

A graduate student, Miss Lillian Seaberg, has been writing up Dickson's notes on a commercial exhibit Indian burial ground at The Fountain of Youth, in St. Augustine. It is an early mission period cemetery; St. Johns IIc in date. Stratigraphic testing in adjacent areas has, surprisingly, yielded a sequence from Orange times to St. Augustine with a well represented group of Deptford material.

The University of Florida, with the cooperation of the Florida Geological Survey and E. H. Sellards, is undertaking a fluorine analysis of human and fossil bones from Vero, Florida, which may throw some light on the question of contemporaneity of the human and animal fossil remains.

The University's third annual summer field session will be held June 14–August 17. Excavation will be in two major sites near Gainesville with brief tests in other sites to provide a wide range of experience.

Florida State University will conduct its second annual summer field session in archaeology, June 15–August 17, under the direction of Hale G. Smith. Work will be centered at the Pine Tuft site near Tallahassee.

This appears from surface indications to be the richest mission period site recognized in Florida. During the spring work has been progressing on a small burial mound, apparently Santa Rosa-Swift Creek, near Tallahassee. A wooden dugout was recovered recently from the Wacissa River.

Main event of the year at Florida State University was the formal opening of the new Anthropology Museum. It embodies the newest concepts in exhibition, standing far above any other similar institution in the state.

During the summer of 1950 the Florida Park Service conducted a survey of Amelia Island in extreme northeastern Florida. Forty-six sites were located, and test excavations were made on several of these. The temporal range was from fiber-tempered to Spanish mission times. Fiber-tempered material was of the Florida Orange period type rather than the Stalling's Island type. Both Florida and coastal Georgia types were found in later horizons. In addition to the aboriginal sites, a portion of the outline of early nineteenth century Fort San Carlos was uncovered, resting on a shell heap. Reports on this work have been completed and await publication.

Virginia. Carl F. Miller is excavating a number of sites in the Buggs Island Reservoir on the Roanoke River in southern Virginia. Most of his work thus far has been in sites which were occupied early in the Colonial period. Before he finishes at Buggs Island, Miller will also dig at a number of pre-Columbian sites.

NOTES

The Wisconsin Anthropological Color Slide Project

With the spread of anthropological teaching and research far beyond the centers in which major museums exist, a marked need exists for the distribution of visual aids. Colored slides appear to represent the best solution to this problem. Color transparencies, either of Kodachrome or other processes, have been used increasingly as a field technique to record data and as a means of presenting information in conjunction with lectures and museum displays. Transparencies available in commercial firms rarely meet the needs of the anthropologist and often the cost is so great that a large series can not be obtained by a small institution or department. It is evident that one solution to this latter problem is to provide a distributing point where duplicate copies of transparencies taken by institutions or individuals could be made available to interested parties. The Bureau of Visual Instruction of the University of Wisconsin has agreed to act as such an agent on a nonprofit basis. To reduce handling and other costs to a minimum, it is proposed to organize the slides into sets that can be sold as a unit. The slides will be numbered and accompanied by a brief description of the subject.

In the past, we at Wisconsin have primarily been on the borrowing end, asking other groups for copies of their Kodachrome slides. How much of an imposition this was on time and loss of use of one's own slides became clear when we in turn had a collection of slides in the field of Physical Anthropology taken by Professor W. W. Howells. Individual requests appear at irregular intervals, requiring constant submission of slides to a processing laboratory to have duplicates made. The group of slides prepared by Professor Howells consists, in large part, of photographs of classic specimens taken in the museums of Europe and the United States. The series of slides, supplemented by Kodachromes of accurate casts when the original specimen was not available, gives full coverage for early man and fossil primates. It will form the first set of slides prepared for distribution. The series will number some 282 slides, the total unit to cost $60.00. It is to be noted that while the set is large, it is by this means that the unit cost can be kept low. Smaller sets on more restricted topics, or with more general coverage, can be developed but at a higher unit cost.

Since the mechanism for distributing this set has been established, it is opportune to suggest that the facilities be also used for archaeology and ethnography. If the idea seems a worth-while one, indication of your interest and aid in obtaining slides which can be duplicated is needed. Would you be interested in purchasing such sets? Do you have slides available that could be duplicated and put into sets? What kind of sets do you think are needed, and how large should these sets be?

Our own feeling is that the slides can be used both as visual aids in teaching and for research purposes. Fossil skulls require views from many angles, a full series of sherds or pottery vessels gives a better idea of a ceramic complex. The individual user, after purchasing a complete set, may select from this group whatever slides he needs for lecture purposes or for research purposes, and have the remainder available for reference. Projected slide series, for which Kodachromes are available, include: Hopewellian features and artifacts including the figurine of Dr. Titterington, Negro village life in West Africa, and African Art.

In the initial stages of the project, it is essential to have an estimate of demand to determine how many duplicates should be made. Sets, other than the series in Physical Anthropology, can only be built up with your cooperation and suggestions. May we hear from you if you are interested?

Orders, or indication of interest in the set of Physical Anthropology slides may be sent to: Harold H. Hailer, Bureau of Visual Instruction, University of Wisconsin, Madison 6, Wisconsin.

Comments or suggestions in regard to other sets may be addressed to the above, or to: David A. Baerreis, Sterling Hall, University of Wisconsin, Madison 6, Wisconsin.

MEMOIRS OF THE SOCIETY FOR AMERICAN ARCHAEOLOGY

Numbers 1–5 and 8 are bound and sold separately.

1. *Big Bead Mesa: an Archaeological Study of Navaho Acculturation, 1745-1812.* By DOROTHY LOUISE KEUR. vi+90 pages, 4 plates, 5 figures. $1.00.
2. *The Tchefuncte Culture, an Early Occupation of the Lower Mississippi Valley.* By JAMES A. FORD and GEORGE I. QUIMBY, JR., with an Appendix on the Skeletal Remains by CHARLES E. SNOW. xii+113 pages, 12 plates, 23 figures, 3 folding tables. $1.50.
3. *The Prehistory of Northern North America as Seen from the Yukon.* By FREDERICA DE LAGUNA. x+360 pages, 30 plates, 33 figures. Out of print.
4. *A Reappraisal of Peruvian Archaeology.* Assembled by WENDELL C. BENNETT. x+128 pages, 72 figures, 6 tables. $2.00.
5. *The George C. Davis Site, Cherokee County, Texas.* By H. PERRY NEWELL and ALEX D. KRIEGER, with an Appendix on the Corn by VOLNEY JONES. xvi+255 pages, 66 figures, 20 tables. $3.50.

Numbers 6–7, bound under one cover, are sold only as a unit. $2.50.

6. *Archaeology of the Columbia-Fraser Region.* By MARIAN W. SMITH. viii+46 pages, 4 figures, 3 tables.
7. *Cattle Point: a Stratified Site in the Southern Northwest Coast Region.* By ARDEN R. KING. xii+94 pages, 25 figures, 13 tables.
8. *Radiocarbon Dating.* Assembled by Frederick Johnson. $1.50.

INFORMATION FOR AUTHORS

American Antiquity publishes original papers in the field of American archaeology, as well as comments, reviews, and discussions on matters pertaining to this field. Articles on other regions, or on such related subjects as geography, history, and ethnography, may be accepted if of special significance to American archaeology.

Accepted papers are published in the order of their receipt, and when printed all papers bear the date of submission.

Manuscripts must be typewritten on standard 8½×11 inch paper, double spaced, and on one side of the page only. Footnotes, if any, should be on separate sheets, also double spaced and on one side only. Bibliographies must follow a standard form. Citations from journals and series should be given as follows:

JENKS, ALBERT E., and LLOYD A. WILFORD
1938. "The Sauk Valley Skeleton." *Bulletin of the Texas Archaeological and Paleontological Society*, Vol. 10, pp. 136–68. Abilene.

Citations from separate books or pamphlets:

JENKS, ALBERT E.
1936. *Pleistocene Man in Minnesota.* Minneapolis: University of Minnesota Press.

Footnotes should be held to a minimum, used only when essential information cannot be incorporated into the text. All bibliographic citations should follow the documentation style commonly used in archaeological publications in which all reference to published or manuscipt material is made directly in the text by citing author, year of publication, and page or figure number; such citations are set off from the text by parentheses. For examples of style consult articles in Smithsonian Miscellaneous Collections, Volume 100 (whole volume), 1940.

When illustrations and/or tables cost more than the price of one full page of halftones, the author must pay for the excess. Photographs for reproduction should be on a glossy paper, unmounted, and of a proportion suitable for reduction to 5¾×8⅜ inches or a portion thereof, making due allowance for captions. Line drawings should be in India ink on smooth, hard-surfaced paper, with figures written lightly in pencil on the margin or the back.

Galley proof, only, will be sent to authors, who will be charged for excessive correction costs. Upon publication, manuscripts, illustrations, and engravings will be destroyed unless their return has been specifically requested.

Reprints without covers are supplied at the following minimum prices, and must be ordered when corrected galley proofs are returned.

Copies	*1–4 pp.*	*5–8 pp.*	*9–12 pp.*	*13–16 pp.*	*17–20 pp.*	*21–24 pp.*	*25–28 pp.*	*29–32 pp.*
25 or less	$5.20	$7.15	$ 7.80	$ 9.75	$11.70	$14.00	$16.00	$17.50
50	5.50	7.75	8.85	11.00	13.00	15.00	17.00	19.00
75	6.00	8.50	10.00	12.50	14.75	17.00	18.75	22.00
100	6.50	9.00	11.75	14.00	16.00	19.00	20.50	25.00
Additional 100's	1.50	2.50	4.00	5.25	6.50	8.00	9.00	10.00

Covers with title and date of issue of *American Antiquity* will be furnished at the following rates: 25 or less for $6.50; additional covers 3 cents each.

TABLE OF CONTENTS

PAGE

Prehistoric Wells in Eastern New Mexico . . . . . GLEN L. EVANS 1

A Workshop Site of Early Man in Dinwiddie County, Virginia . . . . . BEN C. MCCARY 9

Stratigraphic and Area Tests at the Emerald and Anna Mound Sites . . . . . JOHN L. COTTER 18

Basketmaker III Human Figurines from Northeastern Arizona . . . . . EARL H. MORRIS 33

Sites of the Paleo-Indian in the Middle Rio Grande Valley . . . . . FRANK C. HIBBEN 41

HARRY P. MERA . . . . . KENNETH CHAPMAN 47

FLOYD SCHULTZ . . . . . CARLYLE SMITH 49

FACTS AND COMMENTS

Irrigation in East Central California . . . . . RICHARD W. PATCH 50

Archaeology of the Brooks Range of Alaska . . . . WILLIAM IRVING 52

Notes on an Aleutian Core and Blade Industry . . . W. S. LAUGHLIN 52

Notes on Two Archaeological Discoveries in Northern Alaska, 1950 . . . . . RALPH S. SOLECKI 55

A Metallographic Study of Certain Pre-Columbian American Implements . . . . . LEONARD FRANK 57

BOOK REVIEWS

MACGOWAN: Early Man in the New World . . . . . Krieger 61

WILLEY: Archaeology of the Florida Gulf Coast . . . . . Krieger 62

GRIFFIN AND BULLEN: The Safety Harbor Site . . . . . Willey 64

STERN: The Rubber-ball Games of the Americas . . . . Schroeder 65

EGGAN: Social Organization of the Western Pueblos . . . . . Ellis 66

KING: Nalakihu; Excavations at Wupatki . . . . . Wendorf 66

GIFFORD: Surface Archaeology of Ixtlan del Rio, Nayarit . . . . Lister 67

BERNAL: La Ceramica de Monte Alban III . . . . . Kidder 67

THOMPSON: Maya Hieroglyphic Writing: Introduction . . Satterthwaite 69

LOTHROP: Archaeology of Southern Veraguas, Panama . . . Kidder II 71

O'BRYAN: Excavations in Mesa Verde National Park . . . . Morris 72

BOOK NOTICES 74

NOTES AND NEWS 77

AMERICAN ANTIQUITY IS INDEXED IN THE INTERNATIONAL INDEX

UNIVERSITY OF UTAH PRESS, SALT LAKE CITY, UTAH